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# FARMERS DIGEST

## JANUARY, 1939

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| | | |
|---|---|---|
| Farming in Palestine | *Wisconsin Agriculturist* | 1 |
| Hybrid Revolution | *Coronet* | 4 |
| Rainstorms on Tap | *Successful Farming* | 7 |
| Real Profits from Smoked Turkeys | *Poultry Item* | 10 |
| The Combine Harvester | *Ohio Farmer* | 12 |
| Terraces Increase Yields | *Soil Conservation* | 15 |
| She Lost Two Quarters, But . . . | *Ayrshire Digest* | 17 |
| New Blight-Resistant Milo | *Farm and Ranch* | 19 |
| Importance of Breeding Matrons | *Shorthorn World* | 21 |
| Wax Keeps Vegetables Fresh | *American Agriculturist* | 25 |
| Crossbreds Win Acceptance | *Everybody's Poultry Magazine* | 27 |
| Production of Artificial Manures | *California Cultivator* | 30 |
| Where To Place Fertilizer | *Texas Farming and Citriculture* | 32 |
| Improving the Curd Size of Milk | *Certified Milk* | 33 |
| Half Century of Service | *Progressive Farmer* | 36 |
| Soilless Farming | *Farm Journal* | 39 |
| The Milking Shorthorn Cow | *Southern Planter* | 42 |
| Roofs That Weather the Storm | *American Poultry Journal* | 45 |
| Swedish Cooperatives | *Ohio Farm Bureau News* | 47 |
| Boron Deficiency Becomes a Problem | *Better Crops* | 50 |
| Bang's Disease | *Pacific Rural Press* | 58 |
| More Pounds of Wool Per Ewe | *Sheep Breeder* | 61 |
| Keep Manure Piles Wet | *Michigan Farmer* | 64 |
| More and Better Poults Per Breeder | *Turkey World* | 65 |
| Planting Wrinkled English Peas | *Southern Agriculturist* | 71 |
| Short Cut in Liming | *Capper's Farmer* | 72 |
| Feeding and Fattening Hogs | *Rural New-Yorker* | 74 |
| New Techniques in Standardization | *Agricultural Situation* | 79 |
| Cover Crops for Orchards | *American Fruit Grower* | 81 |
| The Breed Associations | | 85 |

# The Farmer's Digest

From more than two hundred magazines and bulletins published in this country and abroad, the Editorial Staff of the Farmer's Digest selects articles of outstanding merit and general interest. It is comprehensive in its scope, covering all phases of Agriculture.

The Farmer's Digest
Published monthly at Ambler, Pennsylvania, by
The School of Horticulture

*25c a Copy* *$2.00 a Year*

*Foreign Subscription $3.00 a Year*

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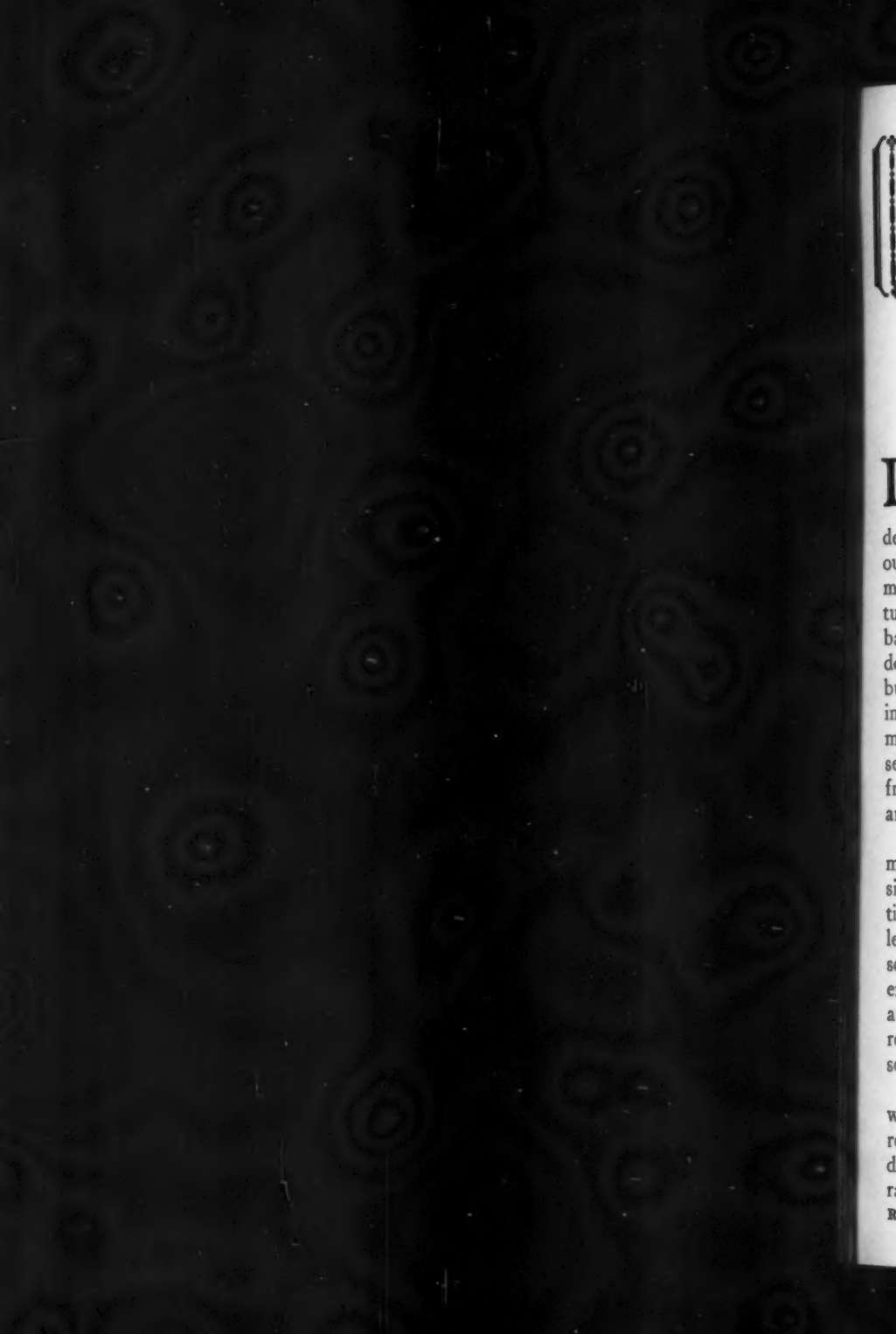
Entered as second-class matter at the Post Office at Ambler, Pa., May 5, 1927, under act of March 3, 1879



# The Farmer's Digest

Vol. 2 January, 1939 No. 9


## Farming in Palestine

Condensed from Wisconsin Agriculturist and Farmer

PALESTINE was the scene of Christ's entire lifetime, but its development in recent decades constitutes one of the outstanding economic and social movements related to agriculture. Agriculture and animal husbandry have always played a dominant role along the Jordan, but Jewish colonization and land improvement in recent times make Palestine today the world's second largest exporter of citrus fruits and a leader in dairying and co-operation.

Palestine, with 9,839 square miles of land area (about the size of Vermont) has a population of 1,280,000, of which at least 50 per cent, exclusive of soldiers and nomadic tribes, are engaged in farming. Rainfall averages 20 inches per annum, reaching but 4.5 inches in the south near Jericho.

It is in the plains country, where the temperatures seldom reach freezing, and along the Jordan valley and the Mediterranean strip, where almost tropical conditions prevail, that the chief farming is done. The heavy soils are rich in lime and potash, but the light hill soils lack both. Low humus content and small nitrogen supply are typical of such land in a dry climate. Except in the lower valleys the soil is in great neglect because of centuries of misuse.

Lack of rainfall is diminishing in its effect on farming because of extensive irrigation works and new discoveries of underground water resources hitherto untouched. Of the total land area under cultivation, about 1,400,000 acres, there are only 100,000 acres intensively irrigated. Such land produces, however, five times as much per acre as the natural land. Between 1933 and 1936 the Jewish companies have bored 475 wells and found 395 of them flowing and successful. Altogether, there are 3,000 wells, mostly equipped with power pumps, and averaging 1,750 cubic feet of water hourly.

Crop statistics as we know

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them are hard to get in Palestine, particularly among the Arabs, who raise most of the cereals. However, the list includes wheat, barley, lentils, corn, beans, peas, Durrah millet, sesame fiber, olives, all the citrus fruits, all the garden vegetables, grapes, some figs, almonds, apples, pears, tobacco and a growing dairy and poultry production. From 1924 to 1936 Palestine's area in citrus fruits grew from 8,500 acres to 70,000 acres, mostly by Jewish colonizers in the Maritime plain. Overexpansion is noted and a halt on new plantings is seen because of prohibitive land values for citrus growing. Orange and grapefruit exports have been heavy.

Cereal yields, even on the better soils, are poor. Wheat, 10 bushels an acre, barley 18 bushels, corn 17 bushels, and millet 10 bushels are common. Olives, wine grapes and fruit are replacing cereals in the hill country. In the dry areas of light soils the Arabs put land in fallow every three years.

Dairy development is directly the work of breeding undertaken in the Jewish farm settlements, in many of which the sale of dairy products represents the chief source of cash income. Native cows of the Arab kind yield 180 gallons of milk annually, whereas those developed by the Jews in crossing Dutch pure bred bulls and native Damascus cows produce an average of 1,050 gallons a year. Similarly, the Jews have by careful selection and mating, using Leghorn blood, raised the average egg production per hen to twice that of the native Arab fowl.

Palestine is a country deficient in food stuffs. It imports large amounts of cereals, flour, sugar, live cattle, sheep, goats, and even some butter and eggs, despite the increase in home supplies. The vast increase in its citrus exports have recently alarmed other competing countries in the East. In 1935 when its orange, lemon, grapefruit and citron exports reached over $17,300,000 in value, the receipts were a source of great prosperity. The United Kingdom takes the bulk of this product, and the chief movement outbound is in the winter months —not competing much with citrus fruits from America; which are exported to Europe in summer time.

The latest agency to hasten the development of Palestine has been the Haavara Co., a non-profit unit founded in 1933 by agreement between Jews and Germans to transfer the capital of German Jews leaving the Fatherland, into German goods which can be used at once in Palestine. In two years, more than $13,000,000 of credit was placed at the disposal of this in-

ternational agency, and 1,600 Jewish families were given help in making their capital transfers, much to the economic advantage of the Holy Land.

Settlers either lease land from the Zionist agency or buy land as private property from the colonization unit.

From earliest farm colonizations in 1870 to 1936 it is said that $120,000,000 in gold has been invested by the Jewish nation in Palestine agriculture. There are said to be 205 Jewish farm settlements with a population of 95,000 and a land area of 366,000 acres.

Improvement of the land as well as of the quantity and quality of the products has followed the introduction of mixed farming systems in Palestine. All farming on Jewish land is of intensive type, with much diversification. This consists mainly in the use of new fruits and the culture of truck crops on a commercial scale, as well as the development of more promising breeds of cattle and chickens.

As a result of the expanded immigration since 1931, many modern dairies have been built, such as in the valley of Jezreel, along the Jordan, as well as in Jerusalem, Tel-Aviv and Haifa.

Palestine has the most advanced co-operative movement in the Orient. The register of co-operatives shows 695 of all kinds, with about 276 of them dealing with agriculture. The oldest co-operative marketing agency is that of the wine growers, which markets 85 per cent of all the liquors made there. Citrus fruits and dairy products are also sold under a large and growing co-operative plan. There are also water supply co-operatives, building and loan co-operatives and credit, transportation and distributing co-operatives. Of the 46 consumer co-operatives, 37 are in rural centers.

# Hybrid Revolution

**Condensed from Coronet**

*Oril Brown*

DESPITE the fact that the United States is the greatest paper-consuming country in history, paper manufacture is chronically one of the sickest industries in the annals of business. Those dizzy swings from prosperity to depression which have been painfully indigenous to all industry only since Black Friday of October, 1929, have been the lot of the modern paper industry ever since its birth—which may be dated approximately from the invention of paper manufacture from wood in the 19th century.

The chief source of wood pulp is softwoods—spruce, fir, hemlock and pine—and temperate hardwoods—poplar, gum and chestnut. The minimum time for reproducing a forest of any of these ranges from sixty to eighty years and there is always a strong chance that the quality of the second forest will not be equal to that of the first. It is little wonder, then, that paper manufacturers have always resigned themselves to regular excursions into the red.

When the Patent Office, however, in publishing its record of plant patents for 1937, recently announced a new national titleholder, superseding the late Luther Burbank, it inadvertently made public for the first time a possible cure for paper's manic-depressive cycles, the dawn of a new era in forestry and paper manufacture. When, in 1936, Professor Ralph H. McKee, professor of chemical engineering at Columbia University, applied for a patent for a hybrid poplar, his invention seemed nothing more than one of those freaks that are the commonplaces of the Patent Office files. But when last year he filed thirteen more applications for patents on hybrid poplars, all identical in phraseology with the first one, it became apparent that not only a new plant patent champion but a major contribution to science had arrived.

Professor McKee's patent applications describe a new and distinct hybrid poplar which has "a very rapid rate of growth in ordinary soil and is parti-

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cularly suitable for supply wood of high grade for lumber and for use in making wood pulp."

In terms of concrete fact, Professor McKee's patented hybrids achieve a diameter of eight inches, or full maturity, in eight or ten years instead of the usual fifty or sixty required for pure-bred poplars. The only requirements for this mushroom development are sunshine and moderate rainfall in May, June, July and August. They flourish on poor grades of land, without fertilizer or cultivator, completely independent of the rich earth and fertilizer indispensable to their pure-bred forebears. They are immune to the ordinary diseases to which poplars are heir. Moreover, they are longer of fiber, infinitely better suited to the making of paper pulp than wild poplars.

During the last two decades, Professor McKee has grown some 15,000 seedlings from hybridized poplars, from which the fastest growing types have been kept. Ultimately he expects to find six or eight that are suitable for commercial cultivation on an extensive scale. At present, representative trees flourish on 300 acres scattered through Maine, New York, Florida, Wisconsin, North Carolina.

The significance of these mushroom-growth yet perfect hybrids, in a world faced by forest-bankruptcy, is obvious. Of the endless forests that once covered the earth, only about seven million acres remain today. All great wood-producing countries except the United States and Canada now restrict the cutting of timber to an amount within the normal rate of growth. But the United States is cutting pulpwood approximately four times as fast, lumber approximately twice as fast as it is growing it. Two-thirds of the states are using more wood than they grow and are headed for complete demolition of their forests.

So acute is the shortage that 50 per cent of all the paper used in the United States is now imported, and the major part of the world's paper ends up on our shores.

As the vanguard of a new species of forest, Professor McKee's hybrids owe their revolutionary leadership not only to their rapid growth but to their easy cultivation. Trees which come to maturity in a decade may not be cultivated only in vast stands planted by paper and lumber corporations but in millions of small crops on millions of average farms. They can thrive on poor farm land that might otherwise lie fallow. They will help arrest soil erosion which annually costs American farmers $200,000,000 and they reduce tax bills in most states, which

now exempt reforested areas from taxation until trees are cut.

Most important of all, because of timber's double service as lumber and pulpwood, farmers would be assured of a diversified market for hybrid poplar crops. And since trees can safely be left in the field until needed, harvesting can be suited to the individual farmer's need and to the current market, withheld when prices are low. In one crop, at least, the golden age of prosperity through production may once again return to agriculture.

## New Device Measures Wool Length Quickly

Measuring length and crimp of wool fibers has always been a slow task, not very accurate. Dr. J. I. Hardy, of the Bureau of Animal Industry, United States Department of Agriculture, has just received a patent on a device to measure quickly the length and the crimp in a single wool fiber, as well as length of other fibers — animal, vegetable, or artificial. Length of fibers—and in the case of wool, crimp as well—has much to do with their value. Longer fibers are more valuable for textiles.

Also, in improving the wool breeds of sheep, breeders have long needed practical and reliable methods of measuring the fibers in a fleece. With fleece records covering several generations, sheep breeders are in a position to find out whether the breeding and feeding program is pointed in the right direction for qualities most needed in textile weaving.

Dr. Hardy's new machine is the latest in a series of mechanical aids for wool laboratories. It is something like the little cloth measuring gadgets on dress goods counters. It will measure wool fibers as short as three-eighths of an inch, accurate to about one hundredths of an inch. One of his earlier patents simplified measurement of the diameter of wool and other fibers. Another made easier the slicing away of thin cross sections for study under the microscope. The Government has free use of all Dr. Hardy's patents.

*Sheep Breeder*

# Rainstorms on Tap

Condensed from Successful Farming

*Ivy M. Howard*

CAN there be such a thing as surplus water on a farm? Just after a two-inch rain, yes; at the beginning of the sixth week of a summer drought, no.

Storing surplus water so that it may be used on the farm *when needed* is recommended by the Soil Conservation Service as one of the best means of lessening the damages of droughts and floods, and increasing the height of the ground water level which in the past 25 years has gone down 20 to 30 feet on thousands of farms in the Midwest.

Terraces, contour-farming, crop rotation, strip-cropping, use of winter cover crops, and grass production on badly eroded land are all good methods of keeping water on the land where it falls so that it may be utilized for plant production, but these practices cannot adequately control *all* the water from the heavier rains. The surplus can best be stored in farm reservoirs.

On demonstration erosion-control projects now under way in practically all the states of the Midwest, terraces and diversion ditches are often constructed to concentrate all surplus water in reservoirs or ponds.

There it can be used for livestock-watering, garden-plot irrigation in the dry seasons, ice-making for summer storage, and for other purposes.

"If water from all terraces on a given farm were directed into a pond or series of ponds, practically all water falling on the farm could be held," says C. C. Girardot, director of the Plum Creek Erosion-Control Project, at Albion, Nebraska. "Much of this water would soak into the subsoil and help in keeping wells and springs from going dry."

In selecting a site for a small reservoir, several factors must be considered. The pond must be located where water from terraces or diversion ditches can be emptied into it after flowing over a wide interval of well-grassed pasture or meadowland; it must be located where the expense of construction will be small; and it must be located where a spillway can be established without injury to farm land.

The use to be made of the pond will help determine its location. If it is to be used for water-

Reprinted by permission from Successful Farming, Oct., 1938, Des Moines, Iowa

ing livestock, it must be easily accessible and have a capacity adequate to afford an uninterrupted supply of water. Ponds to furnish water for livestock should be protected from contamination. Water from lots or feeding pens should be kept out of the ponds by the use of diversion ditches, sediment basins, or some form of filter.

The average consumption of water by 50 head of livestock for a period of 1 year is approximately 1 acre-foot, or 43,560 cubic feet. To allow for evaporation and seepage, quantities far in excess of this amount must be provided.

Loss due to evaporation in central Oklahoma is approximately 60 inches per year. On the Kansas plains and in other sections of the Midwest it is greater. Seepage losses from ponds depend upon the porosity of the soil, being almost nothing in the heavy clay soils.

Garden irrigation in dry seasons, in most sections, can be done successfully with 1½ acre-feet of water per acre farmed, if the water is handled with care. If there is much loss thru distribution channels, more water will be needed. Where possible, ponds constructed to furnish water for irrigation purposes should be located near the land to be irrigated.

Ponds must have a sufficient depth to provide for all seepage and evaporation losses in excess of the water needed for use. For example, in Oklahoma where spring rains must be depended upon to furnish most of the water for the entire year, and where 5 feet of water is lost due to evaporation, a pond constructed on impervious soil would need to be 5 feet deeper than the necessary depth to provide the maximum amount of water needed.

The amount of drainage area needed to supply a pond with water depends entirely upon the size of the pond and the amount of runoff water. In all except the driest regions of the Midwest, 25 acres of drainage will impound about 1 acre-foot of water per year.

Dams for ponds should be built of impervious material with a slope of not less than 3 feet horizontal to 1 vertical on the upper slope and 2 feet horizontal to 1 vertical on the lower slope. The width at the top of the dam should be not less than 10 feet. Ample provision should be made for a spillway of flood waters, with the dam at least 3 feet higher than the maximum flood height. Downstream slopes should be grassed and upstream slopes should be protected from wave action by riprapping with rocks or other satisfactory material.

It is best never to plant trees on or immediately below an

earth dam. When this is done, the roots grow thru the dam to get water from the pond and cause seepage. The dam must also be protected from muskrats, moles, and other burrowing animals. Holes made by these animals should be clay-tamped.

Catfish placed in the pond will prevent damage to the dam from crayfish. Perch will keep mosquitoes from breeding there. Surface minnows, crappies, and bass are helpful in keeping the water free from all decaying animal matter produced by insects, worms, and snails.

Fencing the entire pond to prevent livestock from having access to it is advisable. Water can be piped at little expense to a watering trough located below the pond.

A float and cut-off valve should be located between the watering trough and pond to insure an ample supply of water at all times with a minimum of wastage. The valve and float may be protected from freezing in the winter by an earth embankment around the float valve box.

The quality of pond water can usually be improved by constructing above the pond a sediment basin large enough to hold all runoff water from the drainage area during one rain. This water will seep slowly into the pond thru sand and gravel placed between the sediment basin and the pond to serve as a filter. This leaves all silt in the sediment basin where it can be scooped up.

"The life of a pond depends entirely upon the amount of silt permitted to enter it," points out Dr. N. E. Winters, Regional Conservator for the Soil Conservation Service, in Nebraska, Kansas, and Oklahoma. "Where water from cultivated fields is diverted into the pond, erosion control on the fields by means of crop rotation, contour farming, strip cropping, use of winter cover crops, and other erosion control measures is necessary or the pond will be a mere settling basin and soon lose all its usefulness."

## Phosphate Supply

THE United States possesses the largest known deposits of phosphate rock in the world. At probable rates of consumption, the Florida and Tennessee deposits are sufficient to last for over 200 years, and the western deposits will last for another 2,000 years or so after that.

# Real Profits from Smoked Turkeys

Condensed from The Poultry Item

*George Treat*

SINCE the introduction of smoked turkeys to Park Avenue, New York, from Germany, the demand for this product has exceeded the supply to such an extent that they are being sold at retail for $1.25 a pound—and the producers are getting as high as 95c a pound.

The very nature of the product makes it a farmer's job. While a manufacturing one, it is done entirely by hand, to such an extent that it is doubtful if the large packers will ever consider competing with the turkey raiser on this item.

There are several methods of smoking turkeys. The bird must be carefully dressed, drawn and washed with cold water and hung up in a cool place to become thoroughly chilled. The wings are then removed.

The curing formula may consist of 3 pounds table salt; 8 ounces of nitrate of soda or Chile saltpeter and 12 ounces of granulated sugar. One pound of this mixture is rubbed inside and outside of the turkey, after which the bird is placed in a large jar and allowed to stand for about 24 hours in a temperature at approximately 38° F.

The balance of the mixture is dissolved in two gallons of boiling water. After it has cooled to about 40° F., pour it over the turkey, using enough to cover the bird and allowing it to stand for approximately seven days. At the end of the week the bird is taken out of the brine and soaked in lukewarm water for a few minutes. Wipe the turkey dry with clean cloth and allow to hang for three days in a temperature of about 40° F.

The next step is the smoking. Split the body open, tie stout twine around the legs and neck. By using a dense smoke made of hardwood chips or hickory chips and keeping the temperature of the smokehouse between 90 to 100° F. It will require from 48 to 60 hours to smoke the turkey.

After removing from the smokehouse, allow the bird to hang for another week, which gives meat or muscles time to age and develop a tender, well flavored bird. It may be eaten without being cooked or may be roasted or fried. When it is to be cooked, it should first be parboiled for 30 minutes at a temperature of about 170° F. It should be roasted slowly in the

Reprinted by permission from The Poultry Item, Sellersville, Pa., Nov., 1938

usual way for one hour and 45 minutes to two hours.

The Bureau of Animal Industry is under the impression that the product would be more desirable shortly after smoking than if allowed to dry for many days thereafter.

With the introduction of the food storage lockers, it will be possible for the turkey raiser to smoke a large number of turkeys at one time—then place them in storage lockers until they are sold.

The biggest demand at the present time, according to a recent survey, will be found through delicatessen stores. Meat dealers, as a class, do not take well to the idea, believing that it will interfere with their profession.

The greatest possibilities, however, will be developed by direct sales, either by routes, mail order or in co-operation with some milk delivery company. A Texas turkey raiser inserted a classified advertisement in a city Sunday newspaper, with the result that he was able to sell 187 smoked birds the following three months.

While little work has been done with other fowls, smoked ducks are proving very popular. The objection to chickens has always been their size, which may prove a factor in their favor.

The smoking of fowl has even extended to pigeons, the sale of which has met with favor in some of Chicago's night clubs.

Most excellent prices are being secured for smoked turkeys, some bringing from four to five times their live weights, as evidenced by the $1.25 standard price being secured in New York City. As the expense is little, and the shrinkage within limits, the smoking of turkeys and other fowls should prove to be one of the most profitable operations of the turkey raiser.

## Sulphur

IN an experiment at the Florida station, where commercial laying mash containing five per cent commercial flowers of sulphur was fed to hens, their infestation by lice was considerably reduced at the end of two weeks, and by the close of the third week none could be found. Infestations by the sticktight flea of fowls receiving such treatment, augmented by sulphurizing yards and houses, were brought under control; and of chicken mite, too.

# The Combine Harvester

Condensed from The Ohio Farmer

*G. W. McCuen*

IT was 12 years last July since the first wheat was harvested with a combine near Columbus, Ohio. That day will be long remembered by those who were there. The weather was ideal for the demonstration. Many came from far and near to see the job of harvesting wheat done in one operation. The enthusiasts for the "once over, all over" method were small in number compared to the number of "doubting Thomases."

One of the never-to-be-forgotten features of that day was the serving of biscuits on the spot where the flour from which they were made had been standing wheat just three hours previous.

Ohio farmers were slow at first to accept the combine. Three machines were sold that year, 1926, and only 288 were sold during the nine seasons that followed, 1926 to 1935.

The year 1935 witnessed the introduction of the small lightweight combine and with it a general revival of interest in the combine. Prior to this time the smallest size was the eight-foot cut. There are now approximately 3600 or more combines being used in Ohio.

When one reviews the above figures he is reminded of the introduction of the first wind stackers and self-feeders for threshing machines. This was about 1895 and at that time such attachments were not accepted by the farming public. It was thought that the self-feeder caused the cylinder to do a poor job of threshing and the windstacker would suck a large amount of grain from off the sieves. It was not until 1900 that these attachments were accepted in even a minor way and during the last years of thresher sales over 97 percent of all machines sold were equipped with self-feeders and windstackers.

The slow acceptance of the combine the first nine years is quite comparable to the 1895 to 1905 era of threshers with modern attachments. This in part was due to the size and price of the unit. The past three seasons, as previously mentioned, have shown a definite trend toward a general acceptance of the small combine.

We have been fortunate in having two rather abnormal years close together to study the small combine in the field. The

Reprinted by permission from The Ohio Farmer, April, 1935, 1013 Rockwell Ave., Cleveland, Ohio

year 1936 was ideal. The season was hot and dry, the crop was clean and standing straight. During the year just past the weather was wet and the crop weedy and badly lodged in many instances. These two very different years gave us a chance to study the several sizes of combines when harvesting wheat under ideal and and under bad conditions.

The following tabulation gives a comparison of the same machine when tested under two different season conditions. The machine efficiency is noted in the first column under efficiency and the overall efficiency in the second column. The machine efficiency was based upon the cylinder, rack and shoe losses, while the overall efficiency included all losses of the machine and the cutter bar.

| Size of Machine | Year | Efficiency in Percent Machine | Overall |
|---|---|---|---|
| 5-ft. | 1936 | 99.6 | 97.9 |
| | 1937 | 99.2 | 95.9 |
| 6-ft. | 1936 | 99.3 | 97.9 |
| | 1937 | 97.2 | 90.1* |
| | 1936 | 99.1 | 97.3 |
| | 1937 | 99.0 | 95.4 |
| | 1936 | 99.5 | 97.5 |
| | 1937 | 99.4 | 96.8 |
| 8-ft. | 1936 | 99.6 | 97.9 |
| | 1937 | 99.7 | 94.1 |
| | 1936 | 98.0 | 96.4 |
| | 1937 | 95.8 | 93.2 |

*Tangled and very weedy

It is interesting to note that even under the most adverse conditions, the method of harvesting with the combine was quite efficient.

Professor I. D. Mayer, of Purdue, has done some work in comparing the losses incurred when harvesting by different methods. This work was done in 1933 before the advent of the small combine. The following data will serve as a guide in comparing combine and thresher binder methods.

**Losses of Wheat, Oats, and Soybeans When Harvested by the Different Methods**

| Wheat | Min. | Max. | Ave. |
|---|---|---|---|
| Combined Direct | 0.91% | 4.67% | 2.11% |
| Windrowed .... | 1.90 | 3.33 | 2.52 |
| Binder-thresher. | 2.14 | 12.90 | 4.07 |
| **Oats** | | | |
| Combined direct | 2.79 | 10.65 | 4.96 |
| Windrower .... | 2.22 | 5.61 | 3.32 |
| Binder-thresher. | 1.84 | 5.91 | 3.12 |
| **Soybeans** | | | |
| Combined direct | 2.36 | 14.85 | 8.34 |
| Windrowed .... | 9.37 | 18.96 | 13.20 |
| Binder-thresher. | 13.40 | 39.20 | 23.46 |

It is interesting to note that the crops of wheat and soybeans were best adapted for combining, while oats were not so well adapted. There are some strains of oats now which are being combined quite satisfactorily. They have stiff straw and non-shattering characteristics.

It was found that the rate of travel in miles per hour had a direct influence on the efficiency of the machine, especially if the crop was weedy. It was also found that the average rate of travel the owners were using for the five- and six-foot cut ma-

chines was 3¼ to 3¾ miles per hour; for the eight-foot machine, three miles per hour, and for the 10- and 12-foot machines it was about 2½ miles per hour. At these speeds the machines were performing at their maximum efficiency.

The average acreage per hour for these machines includes all stops for unloading and loss in width of cut for not cutting a full swath. This loss was a variable, depending upon the care which the driver exercised in keeping the machine so that as nearly as possible a full swath was cut. It was found that the five-foot machine cut 2.09 acres per hour; the six-foot cut 2.34 acres per hour; the eight-foot cut 2.45 acres; the 10-foot, 2.85 acres per hour, and the 12-foot machine, 3.10 acres per hour. These rates of harvesting were based on the rates of travel mentioned in the preceding paragraph. I am sure some operators will sight their acreage per hour well above these figures but our observations are based on an efficient job with the minimum waste. Some commercial operators are interested in acreage rather than high efficiency. The privately owned and operated machines were operated for efficiency rather than great acreage.

The length of day for combining is a variable. During 1936 it started at six to seven o'clock in the morning and lasted as long as there was any daylight, while last year the day rarely started before 10 or 11 o'clock. The table below of actual acres per day is based on good efficient operation.

| Length of Cut | Average Hours Per Day | | | | | |
|---|---|---|---|---|---|---|
| | 7 | 8 | 9 | 10 | 11 | 12 |
| 5-foot .. | 14.6 | 16.7 | 18.8 | 20.9 | 23.0 | 25.1 |
| 6-foot .. | 16.4 | 18.7 | 21.8 | 23.5 | 25.8 | 28.2 |
| 8-foot .. | 17.2 | 19.6 | 22.1 | 24.5 | 27.0 | 29.5 |
| 10-foot .. | 20.2 | 23.1 | 27.0 | 29.8 | 31.7 | 34.6 |
| 12-foot .. | 21.7 | 24.9 | 27.9 | 31.0 | 34.1 | 37.2 |

The combine of today is so built that, with good adjustment and good judgment based on common sense, they will perform satisfactorily and efficiently according to the season. There were a number of local "black eyes" for combines last year due to excessive dockage at the elevators. The dockage was found to be due to the grain being too wet or badly contaminated with weeds or other green material. The grain in some instances was delivered with a moisture as high as 26 percent, which was 11 percent above the standard of 14 percent for good keeping. Some comparative observations were made last year on the rise of moisture in weedy grain when combined. As a check, clean fields were sampled before and after combining and the average rise in moisture was about ½ percent and in the weedy fields there was an average rise of three percent. This,

in some instances, was critical.

The success of the combine depends upon using good judgment as to when to start harvesting. Over-anxiety was the most influencing factor for the owners of machines for own use, and in the case of commercial machines the combining of wheat not dry enough was due to large contracted acreage. The urge to get the job done and on to the next caused a lot of trouble last year. Be sure the moisture of the grain is correct for storage, then combine!

# Terraces Increase Yields in the Plains

Condensed from Soil Conservation

*Fred S. Reynolds and Albert E. Coldwell*

Soil Conservation Service

MANY people have an idea that the Great Plains are practically level and do not need terracing for crop production. The fact should be borne in mind that water is the limiting factor in crop production on the Plains, that thousands of wet-weather lakes dot the countryside, and that these lakes receive their water from adjacent "level" land during rains. For clarification of this erroneous idea a survey was made on the Dalhart, Tex., project to determine yields and to measure the effectiveness of terracing and contouring in the area. A secondary objective of the survey was a comparison of the erosion-control value of vegetative covers found on the fields.

Yields of headed grain sorghums, for the 1937 crop year, were obtained on 63 fields. These included some fields that were under co-operation and others that were not. The height, density and kind of crop were recorded. Yields were obtained on 11,485 acres by taking 3,099 samples—1 to every 3.7 acres. The tables show results of the yield survey. The number of farms and acres are given for all comparisons. The larger the number of farms and the greater the acreage the more valuable the results obtained. The terraced fields in this study averaged one-half of 1 percent slope. None was greater than 1½ percent.

Reprinted from Soil Conservation, Washington, D. C.

**Table showing yields of headed grain sorghum on terraced, contoured, and straight-row fields on all except fields with sandy-type soils**

| Treatment | Number of fields | Acres | Average yields per acre |
|---|---|---|---|
| | | | Pounds |
| Terraced ..... | 20 | 4,226 | 720 |
| Straight rows ... | 7 | 882 | 461 |
| Contoured ..... | 21 | 4,035 | 589 |

Comparison of the yields on terraced, contoured and straight-row fields clearly shows the advantage of terracing. The fact that 20 fields with 4,226 acres of terraced land averaged 723 pounds as compared to only 589 pounds for 21 fields of 4,035 acres of contoured land is a strong justification for terraces. The data on straight rows are limited to 7 farms of 882 acres with a yield of 461 pounds, which is still more convincing as to the advantage of terracing. Those who made the survey are of the opinion that the comparative relationship between the terraced, contoured, and straight-row fields would not have changed materially even if a much larger number of straight-row fields had been included.

Field observations showed that all the soils except the deep sandy types lost large quantities of water where contoured as well as where farmed straight. In contrast, terraced fields held and absorbed all the rainfall, and in numerous cases caught floodwater from adjacent areas to augment the rainfall. An excellent example of this is a terraced quarter-section of milo yielding 1,149 pounds per acre, which was flooded in May by run-off from adjacent fields. The four adjacent fields comprising 730 acres (two contoured and two with straight rows) produced from 236 to 506 pounds per acre, with an average of 307 pounds. All have the same soil type, received the same rainfall, and were farmed in a similar manner. The only factor of importance contributing to the high yield of 1,149 pounds was the terraces. Other terraced fields surrounded by unterraced ones showed similar results.

The straight-row fields, sandy soils excepted, were conspicuous by the spotted condition of their crops. The low spots where water pooled produced heavily, while the balance of the field was a near failure in most cases. On the other hand, terraced fields were remarkably uniform throughout, with the exception that the areas just above the terrace ridges were generally better than that below.

**Table showing yields of headed grain sorghum on land terraced 1 year, compared with that terraced 2 years or more; including all soils except sandy**

| Treatment | Number of fields | Acres | Average yields per acre |
|---|---|---|---|
| | | | Pounds |
| Terraced 1 year . | 6 | 1,696 | 656 |
| Terraced 2 years or more ..... | 14 | 2,530 | 768 |

Since no moisture determinations were made over the terraced area, the probable reason for the difference in yields cannot be definitely ascertained. It is believed, however, that both the accumulation of soil moisture from year to year and closer spacing of terraces contributed to higher yield on the older terraces.

Those making the yield survey are firmly convinced of the advantages of terracing. It is our opinion that contouring is only a partial step in the right direction and that terracing should be vigorously pushed on all the soil types except sandy soils.

# She Lost Two Quarters, But . . .

Condensed from The Ayrshire Digest

THAT a defective quarter of a dairy cow may not prove a serious handicap in production, but rather that the remaining three quarters of her udder may assume greater activity, and at least partially compensate for the loss, are the conclusions of Messrs. Swett, Matthews, Miller and Graves, of the Bureau of Dairy Industry, in a treatise entitled "Nature's Compensation for the Lost Quarter of a Cow's Udder."

In an effort to determine just how nature copes with the problem of a cow that has lost one or more quarters during early life, this quartette of scientists made a case study of a member of the research center herd, at Beltsville, periodically examining her udder from the time she was one month of age. And, what an interesting story their record now makes!

Up until an examination made at eleven months, twenty-eight days of age, mammary gland development was well above the average. Between this time and an observation made at one year, six months of age, the udder became poorly shaped and glandular development was definitely below average for length, width and depth, except for the right rear quarter, which showed abnormal enlargement. Although this condition disappeared during the two months before calving, the heifer came into production with the left rear quarter entirely inactive, and the right rear quarter yielding only a little fluid. In fact, normal milk was never obtained from either rear quarter of the udder.

But, notwithstanding the fact that she had but two quarters during her first 365-day lactation, started at two years, six months, she produced 7223 lbs. milk, 410 lbs. fat—a far better showing

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than is made by many a sound cow. Calving again at three years, nine months, she produced 677 lbs. milk, 31.67 lbs. fat in the first twenty days of her lactation before the onset of an udder infection which caused her death. Post-mortem studies of her udder structure were made that promise to throw considerable light on nature's startling ways of meeting such an emergency.

Apparently the tissues of the front quarter, which is usually the smaller, had pushed backward until they displaced a large part of the space normally occupied by the rear quarter. It was reported that a similar change took place on the left side of the udder.

A point emphasized by these experts is the difficulty in making a comparative study of the producing ability of dairy cows when one or more quarters of the udder are defective. According to the scientists who studied this particular case, it is a mistake to attempt to make any allowance for cows with deficient quarters. Some authorities have attempted to compensate for such a handicap by crediting the cow with additional amounts representing certain percentages of the quantity of milk or fat which she actually produced.

In general, it has been assumed that a cow with only three normal quarters will produce only three-fourths as much as she would if her udder were perfect. One of the fallacies of this theory which has been brought out in this report is the fact that on an average, the front quarters produce only slightly more than 40% of the total yield, and consequently the question of whether "blindness" appears in the front or rear quarters should be taken into consideration.

Adjusting the two-year-old record, allowing for the loss of both rear quarters and a normal expectancy of 40% of the total yield of the udder being produced by the two front quarters, these scientists found that this heifer had an estimated producing capacity of 18,057 lbs. milk, 1025 lbs. fat as a two-year-old. Some idea of how far such theoretical adjustments may lead one astray, may be gathered from this case. The authors point out that by adjusting her record to maturity, she had the remarkable production of 23,294 lbs. milk, 1282 lbs. fat, an amount which her breeding and production inheritance would not begin to approach.

Although there is no certainty that nature invariably compensates for lost quarters, in view of this individual case, there can be little doubt that in some instances, especially when the loss occurs early in life, satisfactory provision is made.

# New Blight-Resistant Milo

**Condensed from Farm and Ranch**

THE Texas Experiment Station has again performed a service for Southwestern farmers, especially those living in grain sorghum areas.

Dwarf milo has been the favorite grain sorghum of many western Texas and Oklahoma farmers. It has been a heavy yielder and has produced from 75 to 80 per cent of the grain of that section. About three years ago it was discovered that a disease known as milo blight or milo root rot had attacked some fields and completely destroyed them. This disease spread rapidly throughout the sorghum-producing area until farmers lost from 5,000,000 to 10,000,000 bushels of grain per year. The attention of R. E. Karper, of the Texas Experiment Station, in charge of grain sorghum investigations, was called to the disease when it was first discovered and he immediately set about to find some means of combating it. The first thing that suggested itself to Mr. Karper was to find a strain of milo that was resistant to the disease, and then multiply the seed for general use. He did this very thing, and practically enough seed is now available to supply the demand. The following description comes from Mr. Karper:

Milo root rot has been present in scattered areas in Texas for three or four years and is now spreading so that it is almost universally present in some degree over the whole milo region.

Its effects on the plant and crop so much resemble the effects of drouth or dry weather that most farmers think drouth is responsible for the poor crop and do not know that milo root rot is the real trouble.

Milo blight, or root rot, is carried by Pythium, a soil-borne fungus or water mold. Its effects can be seen when the plants are three or five weeks old. If the season is wet and cold, milo plants may be killed at that stage. If the season is warm and dry, the plants will be stunted but live on and may mature a crop that is from 10 per cent to 60 per cent or more below normal. In 1937, on diseased land at Chillicothe, the old susceptible milo made 1.5 bushels to the acre, while the new resistant variety growing alongside of it, made 32.5 bushels.

If the disease is virulent enough, in a cold, wet season it is not so hard to recognize as

Reprinted by permission from Farm and Ranch, Dallas, Texas, November 1, 1938

the plants are likely to die. It is usually more insidious, however, producing unthrifty plants and low yields like the effects of drouth. The best test to see if root rot is present is to pull up some stalks, slit them through to the very bottom with a pocket knife. If the stalk pulls up easily, the lower roots are dried up and dead and the pith at the base of the root stem is dark red for 1 to 3 inches or more, this is "milo disease."

Thousands of Texas farmers have not raised a good crop of milo for several years and are just now realizing that it is not dry weather but disease that is responsible for the light, chaffy heads and poor crop. Alongside of such crops this year hundreds of demonstrations with the new disease resistant variety are producing fine, large heads and a good crop like milo used to make several years ago.

All of the milos and Darso are very susceptible to this disease. Kafir, hegari, and sumac are resistant.

Milo blight, or root rot, is worse on heavy soils and in low places in the field where run-off water collects and more moisture is available for the crop, which in West Texas is usually where the best crop is made. Such areas are now more likely to produce the least as conditions are most favorable for fungus.

Milo accounts for about 80 per cent of the Texas grain sorghum crop, or about 50,000,000 bushels per year. Losses due to milo blight have run as high as 50 per cent of the crop in some countries. From 5,000,000 to 10,000,000 bushels a year are taken as a toll by this plant disease which has become more widespread and destructive each year.

There is no soil treatment or seed treatment effective to combat this disease. Most all of the milo grown in Texas is Dwarf milo 670, distributed by the Texas Experiment Station during the past twenty years, a good variety but now very susceptible to milo blight. Upon the appearance of the disease the Station set about to develop a new resistant variety.

Seed of the new variety has been widely distributed by the Station. The certified sorghum growers have increased this new type almost to the exclusion of the old susceptible kind this year and will have approximately 1,000,000 pounds of seed for sale to milo growers this fall. After this year only the resistant milo will be registered and certified. Seeds distributed to around 600 farmers in fifty-two counties to be grown for demonstration and increase, through county agents and vocational teachers, will supply another million pounds of

seed, and the Lubbock, Chillicothe, and Spur Stations are producing considerable surplus seed for further foundation seed stock. Within another year the old milo will be practically entirely replaced by the new disease resistant variety.

# Importance of Breeding Matrons

Condensed from The Shorthorn World

*R. C. Forbes*
Chicago

THE importance of sires to breed improvement is inestimable, volumes having been filled with breeder's achievements resulting from the use of outstanding sires. It would be absurd, therefore, to claim that any factor in breed maintenance or advancement supersedes the herd sire. But, preoccupied with glorifying herd bulls, let's not neglect to give due credit to females with which those bulls were mated.

Repeatedly it has been said that prepotent sires afford the quickest and most economical way to breed improvement. That's true only in respect to limited progress. Maximum improvement is worked in the shortest possible time by mating a prepotent desirable sire with a female of equally pronounced merit and potency; and when value of offspring is considered, improvement thus attained invariably is most economical.

Consensus of opinion among experienced breeders is that only sires with dams of all possible merit should be selected for a maximum improvement plan. Thus is importance of close-up maternal ancestry acknowledged; but too often that logic is abandoned and the bull is used indiscriminately on females of promiscuous breeding and merit. In consistency of demanding a herd sire whose merit allegedly was influenced by that of his dam, and expecting him to sire desirable offspring from females which have little or nothing commendable to add to the formula, is a forceful factor in creating "multipliers" rather than constructive breeders.

There are innumerable cases in support of the contention that merit at a reasonable price is decidedly preferable to lack of it at any price. It is well to remember, however, that price does not determine intrinsic worth.

An American custom that

Reprinted by permission from The Shorthorn World, Aurora, Ill., Oct. 25, 1938

tends to hinder breed improvement, but which—thanks to those breeders who crusaded against it—is less popular now than formerly, is the buying of Shorthorns largely because of their "family." We all have seen mediocre females of some "fashionable family" go through auction rings at long prices. The very fact of their inferiority was proof of the fallacy of such procedure, proof that not all members of any "family" are worthy of a place in an improvement program. In Great Britain, where certain strains have been bred constructively in one herd, or contemporary herds, for generations, only top females having been retained for seed stock, there's sound logic in placing faith in a "family" name. But even there, it's well to be alert, having always an eye for individual merit; for no breder ever succeeded in producing continuously any particular strain without culls. Beware of those culls.

A retarding factor in herd improvement in this country is the practice of some breeders of selling their best heifers. Too many seem not to be able to resist cashing their cattle, when offered remunerative prices. No breeder can hope to reach the top, or come close to it, if he persists in selling all his best young females. He may alibi for a time by claiming that he still has the sire and dam of a choice heifer for which he has a tempting offer; but some day the old cow will quit breeding, leaving no female produce with which to carry on what may be the herd's most valuable strain.

Whenever a cow is found that consistently produces superior calves and develops them satisfactorily, the best of her heifers should be kept in the breeding herd regardless of tempting offers. That's how leading British herds are maintained at a high standard. And don't tell me those breeders don't like the feel of money! But they like more the feel of a good beast, realizing that in order to reap a profitable harvest they must sow good seed. And it's that tenacity with which they cling to their best females and choicest bulls that has made it possible for them to gain and hold the export trade which has meant millions to them.

Britain's breeders lay great stress upon their breeding females as well as bulls. And they appraise highly "family trees," too, but only those strains which have proved their worth generation after generation, in some instances covering upward of a century.

Recently prepared Scottish herd data reveal that practically all breeders reserve their best heifers from proven tribes for

the breeding herd—*and they are not for sale*. It is refreshing also to note the number of highly prized regularly producing breeding matrons, some being dams of prominent herd sires, that once were the "toast" of Britain's major showrings. That's not so surprising, however, when we consider that Scottish breeders as a rule develop young stock naturally, especially heifers intended for herd replacement. Nor do they believe in loading show beasts to the limit with excess fat. The original idea that motivated evolving the breed still prevails in Britain. That idea is: The world needs utility cattle that will net the largest return from home-grown feed in the shortest possible space of time. Thus British breeders prefer to look upon their cattle from the utility viewpoint rather than the ornamental.

There's no gainsaying that American breeders have produced, are producing and will produce as good Shorthorns as ever lived. But there is need for more breeders with courage to resist monetary temptation and reserve their best heifers from dams and sires of proven worth, adding them to the breeding herd, thus assuring continuous constructive breeding. No bull, regardless of his prepotency, can consistently sire superior calves from inferior females. His get may display marked improvement over their dams, but it's too much to expect him to beget offspring that will command top prices, or win at major shows, without some assistance from the females with which he is mated.

Fattening yearlings for sale in the fall and fattening common steers cheaply for sale in the spring, is the recommendation of the animal husbandry department of the College of Agriculture, University of Illinois.

These two suggestions are part of a 13-point Illinois beef cattle improvement program which has been outlined by the animal husbandry department for use by Illinois farmers in managing a herd of beef cows and their calves and in fattening steers on Illinois farms.

Based on experimental results and experiences of individual farmers, the 13 recommendations are as follows: Select breeding cows with high earning capacity; use a good, easy-keeping pure bred bull of a beef breed popular in the locality; improve the herd by careful annual culling; have the bull in good flesh at breeding time; breed for early spring calves; manage the pasture so that it provides plenty of feed for six months or more; give all cattle free access to dry, loose salt; feed grain to nursing calves to be sold under 12 months of

age; winter dry cows cheaply on roughage without grain; give stock calves some grain after they are weaned; fatten the yearlings for sale in the fall; fatten common steers cheaply for sale in the spring and feed for seasonal markets.

Points to look for in selecting breeding cows, it is explained, are smooth, blocky, thickly fleshed, medium sized cows with short wide heads, straight backs, long level rumps, thick thighs, wide chest and roomy bodies, and cows that are quiet, vigorous, thrifty and healthy. It pays to reject cows lacking in thickness of natural flesh, those with long legs, shallow flanks, small or unsound udders and cows reacting to tuberculin and Bang's disease tests.

In culling the herd annually, it is best to retain only cows which keep healthy, breed promptly, raise good, big calves and keep in good flesh. Early, large, fleshy and quickly maturing heifers will do to keep but not cows which need grain when dry in winter.

For wintering dry cows, stubble fields, old pastures, corn stalks, straw and a light feed of legume hay are suitable. If there is no legume hay, it will pay to feed one pound daily a cow of linseed meal, cottonseed meal or soybean meal for three months prior to calving.

Calves can be dehorned and castrated during the first month. Most calves will thrive on a full feed of shelled corn or corn and oats in a shady lot or in a creep which excludes the cows. It is recommended that calves be weaned in October whether or not they have been creep-fed.

If yearlings are to be ready for sale in the fall, they will need a full feed for five to seven months. A satisfactory ration includes shelled corn with perhaps a little whole oats plus one pound of soybean meal, cottonseed meal or linseed meal for each seven to 10 pounds of grain, good legume hay and some silage or pasture. It is best to remove the cattle from pasture a month before marketing or by September 1. Corn will need to be ground only when there are no hogs with the cattle.

# Wax Keeps Vegetables Fresh

**Condensed from American Agriculturist**

*Paul Work*

EVAPORATION is one of the two great enemies standing in the way of farm to family fresh. The other enemy is the effect of temperature.

Waxes are fast coming in to use to protect fresh vegetables from drying out, shrivelling and other deteriorations due to loss of water.

The use of waxes is inexpensive. It may be practiced on either large or small scale. Detailed methods and equipment are being worked out in practice.

The form of waxing that appears most commonly on our markets at the present time is with rutabagas which come, largely, from Canada. They are simply dipped in melted paraffin, drained and cooled. Really, it is not quite as simple as that for the roots must be clean and dry, and the temperature must be neither too high nor too low. The method is a bit crude, and the quantity of wax required is pretty large although the cost is not very high.

The newer developments are based on waxes in the form of emulsions which make it possible to apply evenly and thoroughly without heat and with a good finish for the job. Emulsifying is the process by which oils, fats and waxes which are not ordinarily mixable with water, are very finely sub-divided and distributed through water yielding a milky mixture. Our commonest example of an emulsion is milk.

These emulsified waxes find their principal effect in retarding drying out. In addition, they provide an attractive finish glossy as desired. They occasion some change in color. For example, carrots are a deeper and brighter orange. If a borax soap is used in making the emulsion, some disinfection may be counted upon. The waxes probably have little effect upon respiration or other processes that go on within the produce.

Experiments thus far have shown that the loss of water in waxed as against unwaxed vegetables is about cut in two.

A number of different waxes are on the market at the present time. One form of emulsion with borax is patented under the name of Brogdex. This has very high surface tension and does not spread readily and so is ordinarily sprayed on or, sometimes, hot

**Reprinted by permission from the American Agriculturist, Ithaca, N.Y., Aug. 27, 1938**

brushed. The surplus wax, then, must be removed mechanically. This is extensively used for citrus fruits, apples, melons and tomatoes, in the west, especially, for apples that have been washed with hydrochloric acid.

Another paraffin wax with a different emulsifying agent is called Dow wax. This is used primarily for nursery stock—especially evergreens. It is sprayed on and provides no lustre or attractive finish.

The Brytene waxes are of two types. The first is of high paraffin content with some carnauba wax, yields no lustre but is very effective in retaining moisture. It gives a rather dull finish and is suitable for fruits. The second type has a larger proportion of carnauba wax and less paraffin. It is not quite so water retentive but gives a good gloss and fine appearance. This is used for tomatoes, cucumbers, peppers and eggplant.

While the whole tendency in preparing produce for market is toward large scale operation, shed packing and the like, waxing may be practiced either way, on a large scale or a small. On a farm of comparatively low output, produce such as tomatoes may be placed in a wire basket, dipped in a drum or other vessel of emulsion, drained and then spread out and allowed to dry. It is necessary to roll the tomatoes about a bit to prevent accumulation of drops at certain points. This is best done on a lattice or wire screen. Galvanized screen and tubs may not be used on account of the effect of the zinc upon the emulsion. Copper, tin, aluminum and rustless iron are acceptable.

In large scale operations, the processing line includes washing, dipping in the wax, drying and sorting. In many cases, fans or mild heat tunnels are used for drying.

Waxing has taken considerable hold in a good many growing sections. The J. W. Davis Company, of Terre Haute, Indiana, is using the process for their hothouse cucumbers. They have some 35 acres under glass and this is their principal crop. A number of far Western concerns are equipped for handling the thing on a large scale. Manufacturers of packing house equipment are working on desirable apparatus for the purpose.

# Crossbreds Win Acceptance by Performance

Condensed from Everybodys Poultry Magazine

*R. B. Alleman*

THEY'LL ruin the chicken business. All of the efforts to improve poultry through careful breeding over a long period of years will be torn down if this proposition gets a start.

Sounds rather gloomy, but these were some of the doleful predictions that were made when a quiet New Englander by the name of A. B. Hall announced in the summer of 1931 that his hatchery would have available chicks that were produced by crossing Barred Rock males with Red hens. The chicks, when fully developed would have the plumage of Barred Rocks, which seemed to be preferred by the buyers of live poultry in the metropolitan markets.

Had the predictions of the calamity howlers come true, crossbreds would be forgotten by this time, but such is not the case. In the seven years since A. B. Hall announced that he would produce crossbred chicks, there has been a steady growth in demand, and his annual sales on just the crossbreds have gone into the millions. Scores of other hatcheries are also in the business of producing crossbred chicks.

Why did the demand for these chicks develop? What need did they meet among broiler producers? Let Mr. Hall tell in his own words how he got started on the crossbreds:

"Our first crossbred mating was made in 1930. Barred Plymouth Rocks always commanded a premium on the live poultry market. The broiler raiser demanded a Barred bird. We, therefore, used Barred males mated to red females. As the barring factor is dominant in this particular cross, the demands of the broiler specialists could be met. The next problem was—where to try them. We wanted to watch results under a variety of conditions.

"At Toms River, New Jersey, were located a number of specialized broiler raisers whom we were supplying with broiler chicks the year around. Here was one place to make a test. One poultryman was willing to try a lot of the crosses alongside of some straight Barred Rocks. He was an exceptional poultryman, but so outstanding were his results with the Barred-crossed broilers that he was sold after the one trial."

Reprinted by permission from Everybodys Poultry Magazine, Hanover, Pa., Nov., 1938

Another test was made on a Long Island broiler plant, unbeknown, at first, to the owner. A little strategy had to be employed in this instance, because the man was skeptical about trying out ideas that had not been demonstrated as being successful, so a small percentage of Barred crosses was included in a shipment of Barred Plymouth Rock chicks.

Shortly before the broilers were ready to market, Mr. Hall dropped in on this producer to see his flock. As he walked from pen to pen, he noticed that there were a few birds in each pen that were larger than the others, were better feathered, and stood out from the rest. He asked what kind of birds they were.

"Oh, I guess they're a few chicks that you had left over from an older hatch and threw them in to fill out the order," was the reply. "But," he added, "they are certainly head and shoulders above the rest. You can spot a few of them in each pen, and they look about two weeks older than the rest. Wish they all looked like those hundred or so. I could market them about two weeks earlier."

At this point, Mr. Hall revealed to a rather surprised broiler man that those outstanding birds were crossbreds and that they were exactly the same age as the other birds in the pen. So convincing was this demonstration that the producer went over to crossbreds on his very next order, and he was, at that time, turning out about 200,000 broilers every year.

Some breeds and varieties, in the past, have been put over with a lot of powerful publicity. The poultry industry, however, has changed so much in the past 15 years or so that this is hardly possible today. Those poultry raisers who keep poultry merely for the fun and enjoyment that they get out of it are becoming fewer all the time. Poultry raising is now a dollars-and-cents matter. The flock owner is interested in how much money he has left after paying all his bills. He tries to govern his management practices accordingly.

The acceptance of the Barred Hall cross in broiler sections has come about as a result of performance. The change to crossbreds in the concentrated broiler producing sections of the Del-Mar-Va peninsula is probably the most significant change which has taken place in that section. Those who have been traveling that territory and have seen the change occur will tell you that it was not an uncommon thing for broiler producers to lose 40 and 50 per cent of their chicks 10 years ago. Mortality was a death blow to many broiler plants. It is possible now, however, to find

dozens of broiler producers who are raising 98 percent of the chicks which they start.

The vigor which is obtained by crossing of breeds or strains of plants or animals has been observed over many centuries. When a broiler producer can reduce his mortality to a point where it is neglible, it means that much more for him in the way of profits. Just as livability counts for the broiler producer, so does smooth feathering, quicker feathering and faster growth. Those are things which have been responsible for the shift.

The vigor obtained from crossing of breeds of chickens does not extend beyond the first generation. One cannot breed from crossbred stock and hope to get the same results as obtained from the first cross. It just doesn't work. It means, therefore that crossbred chicks have to be produced by mating two breeds which have been bred pure.

Nor does it pay to make crosses in which the parents are of mediocre breeding. The results, then, from crossbreeding are likely to be disappointing, and the offspring may fall short of doing a job as good as that of purebred stock.

While the chief demand for crossbred chicks has come from broiler producers, there is a gradually increasing demand for crossbreds that are to be kept for laying purposes. This is especially true in New England, and it is extending into the Middle Atlantic states.

## What is a "Sport"

FRUIT trees do not propagate true to their variety from seed. Vegetative propagation or budding and grafting is necessary to perpetuate a variety. In many instances a limb has produced fruit of a different or deeper color. This is caused by a change in the growing tissue. Many sports are preferred to the variety on which they originated because of their better color and appearance.—*J. A. Andrew*

# The Production of Artificial Manures

Condensed from California Cultivator

IT has long been recognized that barnyard manures play a most important part in the maintenance of soil fertility but with the decrease in the use of horses due to the trend toward power farming, the supply of barnyard manures has not kept pace with the demand.

Experiments in the production of artificial manures have, therefore, been carried on for a number of years with the result that some very good synthetic manures can now be made from crop residues, weeds and other wastes found on the average farm.

Microorganisms which bring about decomposition usually are present and do not need to be supplied. However, it is necessary to add a small amount of nitrogen that the microorganisms may work more efficiently. Certain acids are produced and the compost becomes sour or acid and the activity of the microorganisms is greatly hindered, if not completely suspended, unless some material such as limestone is added to neutralize these acids or to sweeten the sour condition. Water is essential for many reactions brought about in the decomposition of the compost; also a great deal of heat is developed, the compost dries out and biological action is checked unless a sufficient amount of water is present. Rainfall will supply a large part of the water required but for practical purposes the rainfall needs to be supplemented by additions of water, especially during the first stages of decomposition.

A good grade of artificial manure can be made from leaf mold, grass, straw, or other plant residues, water and a reagent containing nitrogen and lime. Nitrogen may be supplied in various materials, such as cyanamid, ammonium sulphate, sodium nitrate, calcium nitrate, cottonseed meal, tankage, liquid manure, chicken manure, or even green crotalaria. A very effective and inexpensive reagent may be made from a mixture of equal parts of cyanamid and finely ground rock phosphate. If this reagent is used it will not be necessary to add lime, as the cyanamid contains enough of this constituent. If, however, ammonium sulphate is used to supply the nitrogen it will be necessary to add limestone. The mixture generally recommended consists of 45 pounds of ammonium sulphate, 15 pounds of superphosphate and 40

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pounds of limestone, used at the rate of 150 pounds per ton of litter or straw.

Select a level place, about ten feet square for each ton of material, and make a layer about one foot thick. If dry material is used this will require about 400 pounds. Sprinkle the material with water from a garden hose until wet and pack firmly. If close to an irrigation ditch, a more handy way is to dig a trench sufficiently deep and below the level of the water so that the material may be watered from the ditch. Then spread about twenty or thirty pounds of the reagent uniformly over the surface of the wet material. Another layer is made on this one and the process is repeated until five layers have been made or approximately one ton of dry material and 100 to 150 pounds of the reagent have been used. The materials should be spread evenly and the top left flat or with a slight depression in the center to catch and retain as much rainfall as possible. It has been found that 200 to 400 gallons of water are required for a ton of dry material. If the materials are wet or if green materials and dry materials are mixed, as is often the case, less water is required to wet the compost in the beginning. Too much water should not be used at one time as there is danger of washing out the reagent. Compost made in this way can be put up at any time but will require about four months of warm weather for thorough decomposition, unless particular care is taken to regulate the moisture content.

When manure is available, a compost may be prepared as follows:

Put down a layer, four to six inches deep, of the material to be composted and place a layer of manure two to three inches deep on top. Then add water to wet the compost thoroughly, but not enough to cause leaching. The process is repeated, building up the compost heap with alternate layers of litter and manure.

Experiments with manure made in this way have shown it to be comparable to ordinary farm manure, giving about the same effects in every way and having about the same value. Two tons of manure having a moisture content of 75 to 80 per cent can be made from one ton of straw or cornstalks.

The practice of making artificial farm manure cannot be recommended for general farm use, but where conditions are favorable and the facilities are available at little cost, artificial farm manure may be produced which will be equal in value to farm manure and will serve to supplement the inadequate supply of

that important fertilizing material. On the other hand, an alternative practice on the general farm has been suggested. Instead of burning weeds, grass and crop residues which decompose slowly when plowed under, an application of some nitrogen carrier, such as cyanamid, permits the decomposition of such residues and may be an important means of fixing carbon in the soil.

## Where To Place Fertilizer

MORE and more farmers who use commercial fertilizers are learning from experience and experiment that it pays to place fertilizer in bands to the side of the seed or plant, rather than above or below. G. A. Cumings of the Bureau of Agricultural Engineering said the increased effectiveness of fertilizer placed in bands to the side of the seeds or plants and at the proper depth has led some people to believe that the method of application is fully as important as the fertilizer itself.

It is essential in most cases, particularly for crops grown in widely spaced rows, he said, "that the fertilizer be localized within rather limited zones either in continuous bands along the row or in short bands or other patterns at each widely separated hill or plant. Location of the fertilizer at the sides rather than directly under or above the seed or seedling roots, has, in most cases, been found most advantageous."

For potatoes experiments have indicated that fertilizers are most effective when placed in a continuous band, about 2 inches to each side of and slightly below the level of the seed piece. With green beans, placement at each side of the row gave the best results. In 1936 field demonstrations in New Jersey showed that this method gave increases of 70, 48, and 71 bushels, at three separate locations, over the farmers' method of applying the fertilizer on the surface over the bean row after planting. Similar beneficial results have followed experiments with cannery peas, spinach and tomatoes.

The chief advantages of side placement of fertilizer are the elimination of early injurious effects of the fertilizer on seedlings and transplants and the localization of the plant food where it is readily available to the plant. The best distance between the fertilizer bands and the plant or seed has varied somewhat with different crops and soil conditions.—*From Texas Farming and Citriculture.*

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# Improving the Curd Size of Milk

Condensed from Certified Milk

*Irving J. Wolman, M. D.*

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OF late years this country is experiencing a wave of interest in Soft Curd Milk, with the dairy industry, the consuming public and the medical profession all keenly curious as to its nature and implications. The dairy groups particularly feel that after fifty years spent in perfecting cow's milk to its present safe, clean, fresh, uniform and carefully supervised status they might be wise in devoting a bit of time to the undesirable large size character of its curds.

The concept of Soft Curd Milk is an old one but an exact definition must still be formulated, and the questions concerning its dietary usefulness are still to be answered. Can the tension of market milk—considered "hard curd"—be reduced? What are the relations between curd tension, curd size, state of fat dispersion, digestibility and nutritive value? What are the facts and principles underlying the various "soft curd" milks now being brought forward? Under what circumstances should soft curd milk be considered desirable? The next few years will witness a growing store of information with the increase of interest and the multiplication of clinical and research investigations.

Cow's milk becomes solid on reaching the human stomach. It curdles into masses of coagulated protein which are large or small depending upon factors in milk and in gastric juice. Curd formation may be studied either by regurgitation experiments on human volunteers, or with mechanical devices which subject milk to conditions approximating those within the human stomach. Curd size as determined by these methods seems a reliably valid index of curdling qualities as related to digestibility, more so than the clot resistance measurement.

Clot toughness or curd tension is a most important factor in determining the physical character of the curd. As described in a recent American Medical Association report, high tension milks have been found to give rise to strong rubbery curds whereas soft curd milks produce soft, smaller friable curds.

Curd tension is measured in

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terms of the resistance of artificially coagulated milk when cut by a standard knife under attempted standard conditions, and is expressed in grams. Surprising variations in curd toughness can be obtained in the milk from cows in the same dairy herd and of the same breed. Values have been reported as high as 200 grams and as low as 25 grams. Milk from mixed herds in the Philadelphia and New York milk sheds ranges usually between 35 to 60 grams.

Natural Soft Curd Milk comes from cows which have the individual peculiarity of giving milk of low curd tension. It owes its qualities to an abnormally low concentration of casein, although its total solids, solids-not-fat, and fat are low also. Subclinical mastitits must be watched for. Speaking generally this is dilute milk and has a lower caloric value than the standard product. The American Association of Medical Milk Commissions has approved the marketing of such "Soft Curd Certified Milk," of curd tension under 30 grams.

While this naturally selected soft curd milk represents a step in the right direction so far as milk's curd forming properties are concerned, general adoption would necessitate the development of new stock possessing this special hereditary trait.

Several processes have been developed in order to impart artificial soft curd qualities to market milk. These fall into two classes (a) mechanical, and (b) chemical. The two chemical methods, namely, the addition of pancreatic or other enzymes, and the Base Exchange process, involve intimate contact of the milk with active foreign substances with resulting alteration of its chemical composition.

The mechanical procedures can be classified as (a) Mechanical Homogenization and (b) Sound Wave ("Sonic") Homogenization. Proper treatment results in the homogeneous distribution of the fat particles so that they no longer rise to the surface as a cream line. Thorough homogenization can bring high curd tension milk down to values under 20 grams. Curd tension lowering seems to run proportional to the degree of fat dispersion.

One of the arguments frequently advanced in favor of homogenized milk is that the finely subdivided fat particles are more easily attacked by the digestive juices and are therefore more efficiently absorbed. All available scientific evidence, however, indicates that this is not the case, except perhaps in the premature age period. All fat droplets, whether large or small, are finely emulsified in the human intestine before being absorbed into the body.

Pressure homogenized milk is prepared by forcing milk through minute openings under high pressure. The finely divided fat remains homogeneously suspended. There are many variations in the commercial technique of this process and in the ultimate size of the droplets. The force required increases enormously as the size of the globules decreases. Passage through a second apparatus—a clarifier—becomes necessary to get rid of the unclumped sedimenting leucocytes and epithelial cells which otherwise tend to form unsightly sediment at the bottom of the bottles. It is quite possible to destroy the cream line without necessarily improving significantly the curd character. From the standpoint of improved digestibility, milk treated by this process must not be considered adequately homogenized unless sufficiently high temperatures and pressures are used within a mechanically efficient apparatus in proper working order if the curd size is to be significantly reduced.

Sonized (sound-wave-treated) homogenized milk is prepared by passing the fluid at no pressure over smooth magnetically driven discs vibrating intensely with sound wave frequency. The end results, as regards fat dispersion and curd size lowering are similar to those of adequately pressure homogenized milk, although the equipment is entirely different in design and operating principle. Subsequent clarification is not needed. A good proportion of the bacteria in the milk is killed in processing.

A definite lowering of curd tension and curd size can be obtained by sound wave homogenizing a portion of the milk and then mixing this with the remaining untreated fraction. The final product still displays a cream line.

In the preparation of homogenized milks for market, pasteurization must be performed either before or after the processing to order to prevent rancidity which otherwise develops promptly.

The nutritive benefit of adequately homogenized milk—whether pressure treated or sonized—seems to rest in the small curds that form in the stomach of the individual who drinks the milk. Certain other advantages might be mentioned also—improved flavor, uniform distribution of the fat, and protection against theft of cream content. Sound wave treated milk has improved keeping qualities due to the lowered bacterial count.

# Half Century of Service

**Condensed from Progressive Farmer**

***J. Francis Cooper***

RESEARCH has been the handmaiden of agriculture in Florida for 50 years, and has served farmers and growers faithfully and well.

Established at Lake City in 1888 as a result of the passage by Congress of the Hatch Act in 1887, and transferred to Gainesville in 1906, the Florida Experiment Station has had an important part in the agricultural development of the State, and will doubtless make even more important contributions to the future advancement of the state's prime industry.

In addition to the main station at Gainesville, there is a new branch station for tobacco, field crops, and livestock at Quincy; one for citrus at Lake Alfred; one for studying Everglades problems at Belle Glade; another for investigating sub-tropical horticulture at Homestead, and a federal-state co-operative branch at Brooksville for studies with cattle, grasses, citrus, and poultry. There are field laboratories for special crops at Monticello, Leesburg, Hastings, Cocoa, Sanford, Plant City, and Bradenton. The station also co-operates in a federal-state horticultural protection service at Lakeland. Every leading industry and practically every section of the state is covered in research activities.

Cattle have been important in Florida's agriculture ever since cows were first brought in by the Spaniards in 1565. Yet the industry has never made the advancement which would seem justified. At last research has helped to break down the barriers to progress.

Experiment Station animal husbandmen have found that in widespread areas the forages produced are lacking in certain mineral elements, such as iron and copper, calcium and phosphorus. Salt-sick is an age-old problem which has plagued cattle in some sections. By a simple contribution of the experiment station it has been possible to stop the losses. Cattlemen now simply allow their animals access to a recommended mixture of salt, iron, copper, and cobalt. The savings annually amount to many thousands of dollars.

Studies of feeding problems have opened the way to the utilization of by-products (other-

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wise largely wasted) from citrus canning factories and have brought supplemental sources of silage into the realm of cattle feeds.

An experiment station worker discovered the cause of leukemia and paralysis in fowls, two troubles which had baffled scientists for years. He is making rapid progress towards other startling discoveries in connection with leukemia.

When the drainage work in the Florida Everglades was completed to the extent that much land in the area was available for cultivation, the hopes of those sponsoring the project were that it would be a veritable gardener's paradise. Alas, however, it was soon found that only small areas of the muck adjacent to Lake Okeechobee would produce crops.

The Everglades Branch Experiment Station came into existence and its chemists and plant specialists set themselves assiduously to the task of finding the trouble. They discovered that the soils were in need of copper and manganese, and when these so-called rare elements are added as fertilizer, bounteous crops can be harvested.

"Fight insect with insect or fungus" has become a maxim of workers in research at the experiment station. Consequently, natural control of harmful insects now saves Florida citrus growers thousands upon thousands of dollars every year. Pests which the grower largely can keep under control through the use of beneficial fungi and insects are the citrus whitefly, cottony cushion scale, mealybugs, and citrus aphids.

Sandy soils of Florida are especially subject to infestation by small eel-worms or nematodes which attack the roots of certain crops, causing root knot and resulting in severe damage. A very simple method for ridding the land of nematodes was devised many years ago by an experiment station entomologist. Truck growers simply keep the land cultivated during the summer growing a crop which will not be attacked by the nematodes. Result: the nematode eggs hatch and the young starve to death before the winter truck season.

In the realm of field crops, again the station and the U. S. Department of Agriculture have gone to the ends of the earth seeking and finding new crops adapted to Florida. Through the Plant Introduction Garden on the experiment station grounds have come many plants that now occupy places of importance in the economic plant life, among them being crotalaria and centipede, Bahia, and Dallis grasses. In addition, velvet beans, a native crop formerly considered poisonous, have been developed into a

staple cow feed and are grown throughout the Lower South as a result of the Florida Station's investigations.

Studies of packing house costs have enabled citrus producers to reduce expenses and save money for the industry. Farm management surveys have revealed the outstanding principles determining the financial success of farmers as being size of business, production per unit, and price per unit. Contributions have been made enabling Florida growers to claim and procure more equitable freight rates, another saving.

Outstanding home economics studies have concerned nutrition, vitamins, and food preservation. It is interesting to note that these compilations have shown that in the rural schools of certain sections more than 60 per cent of the children harbor hookworms. Of children who repeated a grade in school, 95 per cent were hookworm subjects. Over 30 per cent of the children studied were not receiving proper foods for development and growth.

Tests have shown the efficacy of both summer and winter cover crops and fertilizers in building up run-down pecan orchards and in maintaining good nut production each year, thus overcoming the tendency to alternate bearing of heavy and light crops.

In the field of horticulture, the experiment station has given to Florida and the South the tung oil industry; it has determined that citrus frenching and tung oil bronzing can be overcome by the use of zinc compounds; it has conducted research which makes it possible to store oranges and keep them in good condition; it has isolated the cause of bitterness developing in orange juice when it stands for several hours, and thus laid the foundation for the development of a fresh orange juice industry.

Plant disease investigations of the station are saving millions of dollars annually to Flordia growers, and some crops could not now be produced at a profit had not these studies been made and control measures developed. When diseases have menaced entire crops, strains of these crops which would grow in spite of the diseases have been developed and saved the industry. This is true with tomatoes and tobacco, in particular. The Leesburg watermelon is another example.

Recent research has discovered a way to control brown rot of potatoes. By the simple expedient of applying sulphur to the soil when the potatoes are harvested, to induce an acid condition, the bacteria in the soil are killed. Then before potatoes are planted in the winter, lime is applied to make the soil again satisfactory for potatoes. It is not necessary to repeat the process every year.

# Soilless Farming

Condensed from Farm Journal

*V. G. Frost*

RESEARCH workers in plant nutrition have been growing plants without soil for more than 80 years. What makes the process sound like a new one in the past few years is the notion that soilless methods can be taken out of the laboratory and put to work in a thoroughly practical way, to grow tomatoes, wheat, potatoes, corn and other crops for market.

This notion of a practical soilless agriculture has been helped into the headlines by the words and works of Dr. W. F. Gericke, University of California. The yields he has secured in his soilless farming experiments are truly phenomenal—500 bushels of corn per acre, 2,465 bushels of potatoes per acre, 1,742 tons of tomatoes per acre.

A yield of 300 bushels of *corn* per acre, grown without soil (in tanks of nutrient solution) at the Ohio Experiment Station in 1937 is another headline writer for the soilless farming idea. The Ohio men of science say they are finding from the tanks some new ideas on plant feeding that may change our ideas about fertilizing corn in the field.

One of the newest stories is the one about the soilless farming venture on Wake Island, in the Pacific Ocean. Here one of Dr. Gericke's disciples proposes to grow in tanks of nutrient solutions fresh vegetables for passengers and crew of Pan-American's trans-Pacific giant clippers.

Against all these breath-taking facts and figures is pitted a recent statement of E.E. DeTurk, soil technologist at the University of Illinois. If any farmers are looking for the day when they can sell their plows, corn planters and cultivators for museum pieces, and grow corn for their hogs in a tank in the backyard, then they will get a jolt from DeTurk's statement, that the much-headlined, soilless-farming method "will probably never compete seriously with the production of crops grown in the field in the usual way."

The farmer who looks upon his fertilizer bills as expense, would never be happy farming without soil, for all plant food has to come from purchased chemicals. That's one hurdle. Another hurdle is this: Plants grown in soil anchor themselves, and thus maintain an upright position. When soup-fed from a tank of

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plant food in water, some sort of support must be supplied for the plants. The ability to grow more crops in less space is one big advantage of the soilless method.

What has been said thus far refers largely to the Gericke process, which uses shallow vessels of nutrient solution for growing plants. Supports are provided for the plants that feed on this liquid diet.

Another method is the sand-culture method, in which plants are set in well-drained beds of sand and fed by soaking the sand with the nutrient solution. This method, used at the New Jersey Experiment Station, does not require supports for plants, for their roots take hold in the sand. Feeding the plants in these pure-sand beds becomes a regular chore, just like feeding dairy cows every so often. This method has been used for growing greenhouse carnations at the New Jersey Station at a cost closely comparable with that of soil in a greenhouse.

Commenting on this method, New Jersey's vegetable gardening professor V. A. Tiedjens sees the day when dirtless farming will become a common method of growing seedlings for field plantings on every progressive vegetable farm.

When vegetable growers from all over the state drove to New Brunswick in August for their annual Growers' Day, Tiedjens told them:

"Planting seeds in flats filled with sand, gravel, cinders or finely crushed stone is the most sensible way to produce seedlings. The young plants produce larger root systems when the soilless method is used for seed germination, and the plants are much hardier and more able to resist diseases. No nutrients are necessary at all until the seed germinates. After the plants start to grow the amount of fertilizer can easily be adjusted to suit their needs by regulating the strength of the nutrient solution applied. Many seedlings growing in soil are injured each year because of too much fertilizer. Seedlings grown in sand can be removed from the flats without injury to the root systems."

A little different from the New Jersey method, is the one used at Purdue University. The plants have their roots in a water-tight box of pure sand or cinders; but instead of being fed with a hose, they get their nutrient solution by means of sub-irrigation. The liquid diet is pumped into the sand or cinders from below. When it floods the sand, the pump stops and the solution drains back into the plant soup kettle. A time clock makes the operation automatic.

As good an example as any of the soilless farming idea (though

it's not entirely soilless) stripped for action is the battery of tanks on Max Miller's farm in Talbot county, Maryland. Here are 180 concrete tanks, each 36 feet long, ten inches deep, and 36 inches wide. The four-inch walls are asphalt coated inside. The tanks are arranged in four rows, with walks between for tending the tank-grown crops.

On top of each tank rests a four-inch-deep tray, with hardware-cloth bottom. In the bottom of each tray Engineer John King puts a layer of sterilized straw; on top of the straw, sterilized soil. Plants are set in this shallow soil bed. When the plants get started, the roots go right on through the soil, straw and hardware cloth, and feed from a nutrient solution in the tanks. The distance they travel from soil bed to the nutrient solution is about four inches. The solution on which the plants feed is pumped from a mixing vat to the tanks through two-inch gas pipe.

Plants are supported by wires which hang from cables strung over a framework of heavy gas pipe. Half of the entire structure is covered with tobacco cloth. Tomatoes (the principal crop) beneath the cloth have made better growth this year than the ones outside the tent.

Experimenters in Casper, Wyoming, a mile above sea level, use a modified form of soilless farming by periodically flooding two acres of common sand with a nutrient solution. Practically every variety of garden vegetable, fruit and flowers has been grown in this area where the growing season is less than 120 days.

The system used is exceedingly simple. Irrigation water, from a shallow well, is pumped over a part of the land through ordinary trenches or ditches. On another part of the land, overhead irrigation is used. This method seems to give better results.

The various salts are mixed, packed in rather tight bags, and lowered into the well where the well water slowly dissolves the salts and carries it to the land in the form of a rather weak solution. Casper experimenters find that a weak solution applied periodically is of more benefit than a more concentrated solution; that a concentrated solution retards growth and blooming periods and is advisable only in case where seasonable plants grow too fast and may bloom before wanted for a profitable market.

Casper's last snow comes the latter part of May; the first killing frost, any time after Labor Day. In the 100 to 120 days between these two dates, Casper experimenters have grown to maturity such southern crops as peanuts, tobacco, cotton, sweet potatoes and many ornamental

and flowering tropical plants. Old-time tobacco growers rubbed their eyes when they saw white burley tobacco plants growing in the sand—not just ordinary plants, but plants seven to ten feet high with excellent leaves.

Peanuts grew abundantly and made a good crop of nuts before freezing weather. Sweet potatoes had tubers almost 18 inches long, grown in a layer of straw spread over the sand. All other crops responded equally well to the treatment.

From two acres of sand bed, nourished with a nutrient solution, the experimenters sold over $1,000 per acre in marketable crops. The miniature farm required the partial service of only two operators. The only mechanical equipment employed is a small power cultivator and the pumping plant, made from an old auto engine, plus centrifugal pump operated by natural gas. The cost of salts is $12 per acre.

The crops from this tract, eagerly looked for by Casper housewives, usually bring a premium price. Casper chemists claim and offer proof that the vegetables grown under the new condition contain far more vitamins and mineral salts.

# The Milking Shorthorn Cow

**Condensed from The Southern Planter**

NEARLY everyone of middle age and upwards remembers with affection granddad's big red Durham cows, that were big of bag and body.

In the seventies all Shorthorns were principally of Bates breeding. They carried on well the improvement in milk and flesh of commercial herds that started with the introduction of Bates cattle, which thrilled four continents with the improvement in dairy ability and meat making ability wrought by the use of bulls from the Thomas Bates herd.

The expansion of the range, started in the seventies, came on stronger during the eighties. The western cattle country ran its cattle in large droves. The milking ability of the Shorthorn cow became a fault to the cowboy. A cow that gave more milk than her calf could conveniently suckle was a nuisance. Either she had to be roped and milked daily on the range, or driven miles to the corral, and there milked for some time. And so the carload buyers of bulls drove right past a farm where they could see the udders of the cows from the road. Shy milking Shorthorn cows became favored, and Shorthorn import-

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ers from Scotland took them and their bull calves, both because they were preferred in the states, and because they came cheaper from the thrifty Scots.

In the seventies, a regular trade in heavy milking, good fleshed Shorthorn cows for the Elgin dairy district grew up. Shipped in fresh or closely springing, they were bought by dairy farmers, milked one lactation, sold when dry for slaughter for an amount that closely held their purchase money together. More fresh Shorthorn cows were bought from the cowmen that roamed the valleys of the Mohawk in New York and of the Rock in Wisconsin for another round of milking and slaughter.

The two influences—the range and the Elgin dairy district—reduced the herds of easy milking, easy fleshing Shorthorn cows from their predominance on the farms of the country. Farmers accustomed to picking a herd bull from Shorthorn herds by taking the best looking bull found that they could no longer rely on the calf's siring heifers that would milk well. The nurse cow newly introduced into Shorthorn herds made good looking calves, but ability to sire heavy milking cows was not transmitted by nursing.

And so it took years to bring about a return of interest in granddad's big Durham cows. In 1918, only some 500 out of total registrations of 120,000 of Shorthorn cattle were of the dual purpose type. Their number increased steadily each year from 1918, until in 1936 some 11,000 out of a total registration of 36,000 were of the dual purpose type, called Milking Shorthorns for clarity in name. In England, where the dual purpose type is called Dairy Shorthorns, they never lost their predominance, some 80 per cent of all cattle being of the dual purpose sort.

The prosperity of the cattle trade for the general farmer in the vast meadows of Virginia, North Carolina, Kentucky and Tennessee depends generally upon foundation cows of Shorthorn type that will produce a good beef animal, as well as furnish a large flow of milk. The difference between the receipts of a farm where the Milking Shorthorns are milked and the steers fattened, and of a farm where beef cattle are kept and the steers fattened, is that the Milking Shorthorn farm pays its running expenses from the milk, receives a practically equal income from its steers and females fed for slaughter.

Cost accounting systems kept on some 300 general farms in Iowa, beginning in 1930, show that the dual purpose farmer is ahead of the beef alone farmer in receipts by the milk he mar-

kets through the milk pail, is ahead of the milk alone farmer by the cattle he annually markets on the hoof.

The Iowa general farmer arrived at this knowledge before statistics proved it. Leslie M. Carl, Federal statistician at Des Moines, reports that of some 11,000 milk cows on general farms in Iowa reported by his agricultural reporters, 35.4 per cent are Shorthorns; the next largest milk breed has 29 per cent; the third and fourth largest milk breeds have 9.3, and 8.7 per cent of the total milk cows.

Another feature is their gentleness. They have the even temperament that all Shorthorns have.

Milking Shorhorn cows average 1,400 pounds in weight at maturity, the bulls a ton. The value of the Milking Shorthorn cow sold for beef is considerable. The slaughter value begins with Milking Shorthorn calves. They veal out for good values. A well-raised Milking Shorthorn bull weighs 800 pounds, a heifer 600 pounds at a year of age. From this time on, there is never more than a 60-day period of fattening between cashing any Milking Shorthorn cow or bull.

Commercial milk production is another place where Milking Shorthorns shine. The milk of various breeds varies from considerably under 4 per cent of one special dairy purpose breed, to considerably over 4 per cent for other special purpose breeds. Dual purpose breeds, such as the Milking Shorthorn, the Red Poll and the Devon, average 4 per cent.

Red Oaks Olivia, a Milking Shorthorn cow, owned by Graham Land and Livestock Company, Waverly, Minnesota, lately completed a record of 19,756 pounds of milk and 714 pounds of butterfat at the age of 12 years. This is the highest American record in milk for cows 9 years and older, in butterfat for cows 12 years and older.

The world's record for butterfat production for cows of all breeds, and on any number of milkings a day, is held by an Australian Milking Shorthorn cow, Melba 15th of Darbalara, that in 1924 completed an official record of 1,614 pounds on three milkings a day. The next highest is that of the Holstein cow, Carnation Ormsby Butter King, 1,402 pounds of butterfat on four milkings a day.

# Roofs That Weather the Storm

Condensed from American Poultry Journal

*A. O. Braeger*

THE roof of the poultry house is subject to more weathering than any other part of the house and a poorly built roof can cause unsanitary conditions in an otherwise well-constructed house.

Probably the most popular roofing is some type of composition, water-proof material. When roll roofing is to be used, it is best to build the roof of matched and dressed lumber, such as is often sold as barn floorings. The greatest objection to using ordinary unmatched lumber is that roofing paper does not wear so well over this material because of a tendency for the wind to blow through the cracks and wear the paper as it flaps up and down against the edges of the boards. Roll roofing surfaced with slate or talc is used extensively. It can be laid over sheathing or insulation boards. Oftentimes, a layer of felt paper or other insulation material is placed under the roll roofing to help insulate the house. On poultry houses where the pitch of the roof is very slight, the built-up roof is very popular; composition felt paper or roofing is laid and then covered with roofing asphalt or hot pitch. The latter material can be spread by a heavy broom or a long-handled brush. This makes an inexpensive, durable roof.

That metal roofing has been made popular because of proper insulation has been pointed out by workers at the Ohio Agricultural Experiment Station. Galvanized sheet metal has been used on many of the newer poultry houses and the best quality of heavyweight galvanized metal roofing has the advantage of being more leakproof, more durable, and less expensive to maintain. Because of its light color, galvanized metal reflects much of the summer heat that is absorbed by a dark-colored roof. Galvanized roofing is also well adapted for use on range shelters.

Some poultrymen have laid the corrugated sheets over ½-inch insulation board, the insulation board being used instead of lumber sheathing. A roof laid in this manner will give practically a lifetime of rust-free service under average rural conditions. When buying metal sheeting, it is best to purchase that which is coated heavily with zinc, for zinc is the protective material which keeps the steel from rusting. Like-

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wise, when nailing the sheeting on, use nothing but good galvanized nails with lead underneath the head so that the opening is filled up. When these nails can not be had, lead washers can be used. The soft lead will fill the hole around the nail and prevent leakage and rusting of the sheet at that point. A galvanized roof is easy to put on, fire-proof, lightning-proof (when properly grounded), strong and economical.

To ground metal roofs, use a conductor such as galvanized pipe, rod or cable, heavily coated with zinc and put one at each of two diagonally opposite corners of average sized rectangular buildings. On long buildings, grounds should be put at intervals of 100 feet. The roofing metal and conductor can be connected by means of a tight bolted or riveted joint. In cases where galvanized pipe is used, the end may be flattened, bent over, drilled, and bolted directly to the roof with galvanized bolts. It is a safety-first measure to see that the conductor is at least 2 inches away from wood walls at all points. The lower end of the conductor can be clamped or coupled to a pipe driven into the earth far enough to reach the level of permanent moisture. The ground pipe should be inspected occasionally and replaced if badly corroded.

Another type of roofing that poultrymen have used is shingles—metal or asphalt. Both, of course, are not only water-proof, but fire-proof as well, and will keep the roof in good condition for many years. Both are ideal for re-roofing as well as for new work, and are being used on all farm buildings.

Several years can be added to the life of a roof if it is inspected and repaired each summer. The variable temperatures, storms, and wind of winter nearly always leaves some weakness in the roof, such as opening up seams, around chimneys and ventilators.

Cracks and seams can be mended by filling them with a plastic cement. When all the holes are filled, and the roof nailed down firmly, it might be well to cover it with an asbestos asphalt, or other type of roof coating. These materials can be secured in liquid form and are easily brushed on. Allowing leaky roofs to go unrepaired can result in poultry losses. Moisture which comes through holes in the roof quickly rots out sheathing and framing as well as any ceiling material, such as insulation board or straw. A plastic patching material may be used to repair joints around ventilators, chimneys and similar joints in the roof. Where a roof is being remodeled or made-over, as in the case where a semi-monitor house

is converted into a combination roof type, it may be necessary to put new roofing over the entire roof. If not, care should be taken to see that the new roofing material is well lapped over the old portion so that it will be watertight. To get the best results when laying the various types of roofing material, each should be applied according to the manufacturer's specfications.

Putting gutter pipes on new houses or houses that are being re-modeled prevents the water running off of the roof from being blown into the laying house. On certain types of houses as the New Jersey types and the Ohio Laying House, an overhang is extended from the front to protect against heavy rains. The overhang or "drip" as it is sometimes called, usually is about 1½ to 2 ft. in length.

# Swedish Cooperatives

**Condensed from Ohio Farm Bureau**

*Albin Johansson*

**President, Kooperativa Forbundet, Stockholm, Sweden**

IN the Swedish consumers cooperative movement we have learned that there are two essential factors for the successful operation of our own economic enterprises, namely knowledge and capital. In co-operative enterprises it is necessary that the members have some economic knowledge and that everybody contribute towards the common capital.

In Sweden every citizen can become a member irrespective of occupation, religion, or political affiliations. Politically, the movement is absolutely neutral. The common purpose for all members is to lower the cost of living or, in other words, to raise the standard of living. To do this the members must have economic knowledge and the necessary capital to operate their co-operative business. It is necessary for the members to study to get the knowledge, and it is also necessary that they learn to save systematically.

We realized quite early that in order to operate successfully it was not enough for members to buy shares to start the co-operative but that ability to manage the business was just as necessary.

The real strength of a co-operative society cannot be meas-

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ured by the size of the capital; it lies in the ability of the members to manage their own private finances and the business of the co-operative. The capital increases when managed by able members. That is why education in economic subjects is one of the most important activities of the Swedish co-operative movement. We organize our members in study circles, we supply correspondence courses, we have a college for training employees and directors. The co-operative movement publishes a weekly magazine which has the largest circulation in Sweden. We also are the largest publishers of economic literature.

It was first necessary to interest the members in putting their own financial affairs in order; for without the foundation of a sound family budgeting, co-operative enterprise cannot gain the necessary strength. In other words, the members should not go in debt and should not spend their income before it is earned. The members should buy for cash. To accomplish this the Co-operative Movement for many years conducted an intense educational campaign to do away with credit business, so that today practically all co-operative business is on a cash basis. This habit has also become the rule among a great many other consumers. As a result of cash trading we have now a very solid ground for consumer co-operative activities. But it has not been easy for consumers to break away from century-old habits of buying on credit and it has required strength of character to stick to the habit of buying for cash. But Swedish families have demonstrated that they possess this strength of character.

The co-operatives follow the same program as their members; they also buy for cash. That means spot cash. The rule is this: Co-operatives do not borrow money from the banks or the government and do not buy goods on credit. They operate entirely on the capital that the members have supplied. Consequently many societies at the start concentrated on only one commodity. Members paid the regular retail price and the earnings were credited to the members in proportion to their purchases. In this way capital was built up and the co-operative was enabled to expand its activities to other commodities under the efficient control of the management. Through this gradual development a full-fledged co-operative society was created. In certain cases organized consumers also purchased a private retail business and transformed it into a co-operative society.

The retail co-operatives in Sweden are federated into a central organization, Kooperativa

Forbundet. We call it K. F. K. F. functions as a wholesale, and in addition carries on extensive educational activities among the members and the management. Furthermore K. F. owns a number of big factories in different lines such as margarine, flour, macaroni, bread, shoes, overshoes, automobile tires, vegetable oils, electric lamp bulbs, and so forth.

As a general rule our co-operative factories have been established in order to protect our members form the price-pegging policies practiced by monopolies. For in Sweden as in many other countries, private monopolies have been widespread, organized wholly for private gain and without consideration of the interests of the consuming public. Thanks to the manufacturing activities of K. F., an efficient check against monopoly prices has been put in the hands of the consumers. The consumers' co-operatives tell monopolies what is a just price. They act as a yardstick for private business.

We have no anti-trust law in Sweden; we only have a law for the government to study monopolies. The power of K. F. is based on the accumulated capital of the local societies and ultimately on the sound finances of the members. The effect of this control is felt not only in those fields where K. F. operates its factories but also in other lines of consumers' goods, for private manufacturers know that if they try to peg prices at unreasonable levels K. F. both can and will start manufacturing in this line.

When K. F. started production of electric lamp bulbs in order to force the European lamp monopoly to reduce its prices, the result was that the Swedish people made an annual saving on this article of about two million dollars. It meant that the standard of living was raised, and that more workers were employed. The examples could be multiplied; they serve to illustrate the general effect of K. F.'s activities in lowering the prices of food and goods and also increasing employment. But lowering prices does not lower wages. Practically all employees in Sweden are organized in labor unions. Wages are regulated by friendly agreement between employers and employees. If the parties cannot agree, an arbitrator appointed by the government must intervene.

# Boron Deficiency Becomes a Problem

Condensed from Better Crops with Plant Food

*R. L. Cook*

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THE possible deficiency of Michigan soils in nutrient elements other than those usually applied in commercial fertilizers has been under study for several years. These studies have indicated a deficiency of boron for certain crops on a number of soil types. A lack of boron in the soil is evidenced by certain characteristic plant symptoms, by rate of growth, and by date of maturity. In this article are presented descriptions of boron deficiency symptoms on various crops, and some results of the effect of borax on the yields of certain leguminous plants.

As a result of the findings of Kotila and Coons, the attention of the Soils Section of the Michigan Experiment Station was recently called to a certain disease of sugar beets known as heart rot. For several years attempts were made by European investigators to trace the cause of this disorder to some organism, but it was finally shown by Brandenburg and later by others that the injury was due to a deficiency of boron in the soil. Vilkaitis reduced heart rot infection from 51.7 to 4.4 per cent by the application in water solution of 5 kgm. of borax per hectare. Further reductions of 1.2 and 0.5 per cent were obtained by 10 and 20 kgm. applications respectively. Brandenburg reported complete prevention of heart rot in pot tests as a result of additions of 30 to 50 mg. of boric acid per plant, and similar results in the field as a result of the application of 20-25 kgm. of boric acid per hectare. He stated further that the beneficial effects persisted the year after the application. Kotila and Coons obtained the most vigorous growth of beet plants in quartz cultures as a result of the applications of 20 pounds of borax per acre. They reported also the recovery of sugar beets inflicted with heart rot as a result of placing them in soil treated with borax.

As a result of inquiries regarding the addition of borax to sugar beet fertilizers in Michigan, a small amount of field plat work on this problem was conducted by the Michigan Station.

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During a survey of a portion of Michigan's sugar-beet-growing area in the fall of 1937, many of the characteristic boron deficiency symptoms described by Brandenburg and Kotila and Coons were observed. A darkened and cross-checked leaf petiole is indicative of boron deficiency. Likewise, a shortened petiole and twisted leaf indicates a need for boron.

In late August or September many beets on boron-deficient soil are found to have an entirely dead heart. As the new fall growth of leaves comes on, these beets may fail to put forth new leaves or the new growth may be sufficient to entirely cover up the dead heart. Side cankers and internal discolorations are also characteristic symptoms of this disorder. In some cases the discolorations extend to the surface, while in other cases they can only be detected by slicing the beet.

In some fields where the deficiency was not serious, injured beets were found scattered among healthy beets, while in many cases whole patches were affected.

As might be expected, all of the deficiency symptoms were not always found in the same field. In some fields only leaf symptoms were apparent, while in others the presence of cankers or dead hearts furnished the clue that a boron deficiency existed. In most cases beets with dead hearts showed cankers and discolorations as well.

Further work in this laboratory, the results of which will be published later, has shown definitely that the described symptoms were actually indicative of boron deficiency. This was accomplished by splitting the injured beets and planting the halves in quartz cultures with and without boron. Shoots from halves which received boron made a more rapid growth than those from corresponding halves without boron and did not put forth leaves showing the characteristic deficiency symptoms. The untreated halves, on the other hand, all produced leaves with the same symptoms noted in the field, except in one case in which the untreated half failed to grow.

Attempts have been made by various investigators to correlate boron deficiency with certain soil conditions. In experiments with Washington Navel Orange trees, Haas found that when high concentrations of calcium were used in solutions supplied to sand cultures, it was necessary to increase the concentration of boron to prevent boron deficiency symptoms. Solunskaya explained the more serious infestation in sugar beets on alkaline soils as being due to the greater top growth and the corresponding greater need for boron, rather

than to the fact that boron is not readily available in alkaline soils. Also working with sugar beets, Fron reported a pH of 8.0-8.5 for most of the soils where boron deficiency injury was encountered. He also reported the greatest injury on soils where the moisture content was low. Brandenburg reported that heart rot occurred on acid as well as on alkaline soils. Willis and Piland reported three cases of a definite response to borax, one with alfalfa and two with romaine. All three occurrences were on liberally limed soil.

*Experimental.* In the 1937 survey mentioned above, soil samples were taken in numerous fields. An attempt was made to correlate boron deficiency, as indicated by the plants, with some condition in the soil, either reaction or boron content. As deficiency symptoms were more commonly found on Miami soils than on any other single soil series, the laboratory experiments to date have been confined to the Miami soils.

Of 24 samples obtained from this soil, 16 were from soils on which the beets showed boron deficiency, while 8 were from fields free of deficiency symptoms. Of the 16 apparently boron-deficient soils, 14 ranged in pH from 7.1 to 7.9. From this data it would seem that boron deficiency is more likely to occur on alkaline than on acid soils. When the other eight samples are considered, however, a doubt is cast on this relationship. Of the eight samples taken from areas where boron deficiency did not occur, five were alkaline with a pH from 7.0 to 7.4.

In the fall of 1936 the writer decided to undertake certain experiments which might reveal the effect of boron deficiency on other commonly grown Michigan crops. It was hoped that a knowledge of boron deficiency symptoms on several crops would make it comparatively easy to spot boron deficient soils and thus simplify the problem of making the proper borax recommendations for sugar beets.

Alfalfa, barley, beans, corn, sweet clover, red clover and alsike clover were grown in a greenhouse in 1-gallon glazed earthenware jars, each filled with 5 kgm. of white quartz sand. Nutrient mixtures and rates of application were exactly as described by Muckenhirn of the University of Wisconsin in his boron experiments with lettuce, except that sodium tetraborate was used in place of boric acid, and the nutrients were added in four separate applications. Two additional applications of the soluble nutrients were made in the case of alfalfa. By frequent weighings the moisture content of the sand was maintained at

10 per cent. Treatments were replicated four times.

Alfalfa and alsike clover were also grown in glazed earthenware jars filled with soils from fields where previous crops had shown signs of boron deficiency. The alfalfa was treated with $Na_2B_4O_7$* at the rate of 2 pounds per acre, and the alsike clover received 3 pounds of the same material. Treated and untreated cultures were set up in replicates of four. All cultures received complete nutrients other than boron.

As the experiments were conducted, considerable variation was noted in the response of the different crops to applications of boron in the form of $Na_2B_4O_7$.

*Alfalfa.* Planted on April 1, this crop first showed definite symptoms of boron deficiency during the first few days in June, just about the time the first blossoms appeared. A reddening of some of the leaves was first noticed. The red or bronze color first appeared near the tips of the leaves and on the under side between the more prominent veins. From there the color spread until it included almost the entire surface and was noticeable on the top as well as the under side. After the leaves had been red for several days they turned yellow and died.

The pot cultures showed very distinctly that the red or bronze coloration was almost entirely eliminated and much greater yields obtained by a total application of 0.003 gms. $Na_2B_4O_7$ per pot. Furthermore, this control lasted through three cuttings with distinct differences in growth still apparent in the early growth of the fourth crop. The data presented in table 1 show the effect of the treatment on the yields of alfalfa.

**Table 1—The Effect of Boron on the Yield of Alfalfa Grown in Quartz Sand Cultures**

| Treatment | Yield in grams (Average of 4 Pots) | | |
|---|---|---|---|
| | July 8 | Aug. 12 | Oct. 30 |
| $Na_2B_4O_7$—0.003 gms. per pot .. | 5.15 | 3.95 | 2.80 |
| No boron ..... | 3.63 | 2.28 | 1.70 |

On July 8 alfalfa was planted in 2-gallon jars filled with soil from two fields where in 1936 sugar beets had been seriously injured by heart rot. Four jars of each soil received no boron, while four received 2 pounds of $Na_2B_4O_7$ per acre. The results, presented in table 2, show that 4.3 and 18.4 per cent increases in yield of alfalfa were obtained on the dates indicated as a result of the boron application to the Gilford soil, while the increases in yield on the Nappanee soil on the same dates amounted to 14.4 and 14.1 per cent.

*Red and Alsike Clover.* As a result of certain observations in the field during the latter part of July, the possibility became ap-

parent that a deficiency of boron might produce symptoms in red and alsike clovers very similar to those produced in alfalfa. To test this possibility, both of these crops were planted in quartz cultures on July 28 and August 18. For some reason, not surely known, the red clover died before yields or pictures were taken, but in the early stages it showed differences in growth favor of applied boron, and the deficiency symptoms were very similar to those occurring on alfalfa. Only one difference was noticeable. The reddening of the red clover leaves started in the veins of some of the leaves, while in the case of other leaves the first indications of red were between the veins as in alfalfa.

**Table 2—The Effect of Boron on the Yield of Alfalfa Grown on Two Boron Deficient Soils* in Pot Cultures**

| | Yield in Grams (Average of 4 Pots) | | | |
|---|---|---|---|---|
| | Nappanese Soil | | Gilford Soil | |
| Treatment | Nov. 16 | Jan. 17 | Nov. 16 | Jan. 17 |
| $Na_2B_4O_7$—2 lb. per acre | 9.5 | 6.4 | 7.3 | 4.5 |
| No boron | 8.3 | 5.6 | 7.0 | 3.8 |

*The soils were considered to be deficient in boron because they had produced sugar beets afflicted with heart rot.

Alsike clover showed a very definite response to application of boron. When planted in quartz cultures the plants not treated with boron made very little growth and soon turned red. After a short time in this condition the leaves turned yellow, and the plants would soon have died had they not been harvested. The differences in yield, shown by the data in table 3, were more pronounced than in the case of alfalfa.

**Table 3—The Effect of Boron on the Yield of Alsike Clover Grown in Quartz Sand Culture**

| | Yield in Grams (Average of 4 Pots) |
|---|---|
| Treatment | Nov. 16 |
| $Na_2B_4O_7$—0.002 gms. per pot | 2.22 |
| No boron | 0.80 |

As a further check on the boron deficiency symptoms in alsike clover, sandy loam soil was gathered from a place on the college farm where the symptoms occurred. On August 18 the clover was planted in pots filled with this soil. The only treatment was an application of 3 pounds of $Na_2B_4O_7$ per acre on one-half of the jars. There appeared at first to be a slight injury, evidenced by slower growth, as a result of the boron application, but the evidence of this soon disappeared, and slight deficiency symptoms in the nature of reddened leaves appeared on the untreated plants. The plants treated with boron matured earlier than did those not treated.

*Sweet Clover.* Experiments with sweet clover produced results somewhat similar to those obtained with the common clovers and alfalfa. Differences in yield as a result of boron applications were not so great as in the other crops, and the red and bronze coloration in the leaves was not as pronounced. It is believed that in the case of this crop there is more of a tendency for the leaves to turn yellow without passing through the red and bronze stage.

*Barley, Beans, Buckwheat, Corn, Oats, and Rape.* In the 1937 experiments barley, beans, and corn were raised in quartz sand cultures by planting the seeds in the usual manner. None of the crops showed indications of a need for boron. It was thought that perhaps there was enough boron in the seeds to supply the needs of the plants. To determine whether or not this was true, new cultures were prepared during the spring of 1938, and barley, beans, corn, and oats were transplanted into the cultures after the seeds had been removed from the transplants. Thus the plants could have obtained only a very small quantity of boron from the seeds.

After the first crops of beans, buckwheat, and corn were harvested, a second crop was immediately planted. One crop of rape was also grown.

Despite all the precaution to eliminate boron from the culture, none of these crops showed symptoms of boron deficiency. This is, no doubt, due to the small quantity of boron which is needed by these crops. According to Bertrand and Silberstein certain members of the Gramineae contain only 2.3 to 5 mg. of boron per kg. of dry matter, while the legumes are relatively high in boron, with red clover, for example, containing 36.2 mg. per kg. of dry matter.

While the boron deficiency symptoms were being checked in the greenhouse, the writer made several interesting observations in the field. At the time of the first cutting of alfalfa a search was made for symptoms of boron deficiency in the alfalfa fields of various sections of the State. At this time the symptoms were most pronounced in the area around Unionville and Sebewaing where heart rot of sugar beets was most serious in 1936.

In the second crop of alfalfa it was again noticed that deficiency symptoms occurred at about the time the first blossoms appeared, in late July and early August. At this time plants on many fields showed the symptoms where they had not been found in the first crop. This would seem to indicate that as the season progressed the supply of available boron in the soil be-

came depleted to the point where the amount was insufficient for the needs of the second crop.

One field observation which seemed to lend proof to the fact that the symptoms in question were actually caused by boron deficiency was the tendency for the symptoms to appear in patches, sometimes so prominent that they could be observed for several rods as one passed along the road. This tendency to occur in patches was also noticed in the case of heart rot of sugar beets.

It was repeatedly noticed in cases where mixed clovers and alfalfa were growing together that where boron deficiency symptoms occurred on one plant they occurred on the others as well.

Mention has already been made of a short survey conducted in late October to ascertain the extent of boron deficiency injury in sugar beets. An attempt was made to examine a field of alfalfa in the vicinity of each field of sugar beets. It was very evident from the survey that the red and bronze markings on the alfalfa were especially plentiful in those areas where the sugar beets gave evidence that boron was lacking in the soil.

If it is true that the discussed symptoms are indications of boron deficiency, and it would seem that the greenhouse pot tests are sufficient proof, there is a large aggregate area of the upland soils of Michigan which is sufficiently lacking in boron to produce the characteristic symptoms. The task still remains to show by field experiments that such deficiencies are economically injurious. It seems logical for the present, however, to assume that any agency which results in the death of alfalfa and clover leaves before harvest time, and in such serious disorders in the sugar beet, must surely affect quality and lower yields. Even though the growth of beets was not depressed, a considerable loss would result from the necessity of closer topping to remove the injured tissue.

A word of caution is advisable regarding the chance for confusion between the boron deficiency symptoms occurring on alfalfa and clover and other discolorations which may occur. There are other conditions which may lead to red markings on the leaves of these plants, and in many cases it will be necessary to resort to other methods of checking the boron content of the soil before it is definitely classed as being deficient in this element. Perhaps a chemical test of the soil or plants is the best answer to this problem.

*Summary*

During 1936 and 1937 field plat experiments were conducted

to determine the efficiency of borax as a control for heart rot of sugar beets. During the course of these experiments it was observed that heart rot is quite common in certain sections of Michigan, and that certain characteristic symptoms indicate the presence of this disorder and consequently the lack of boron in the soil.

As a result of certain experiments with several crops grown in quartz cultures in the greenhouse, characteristic boron deficiency symptoms were also established for alfalfa, red clover, alsike clover, and sweet clover. From these investigations certain conclusions and observations follow:

1. Where heart rot of sugar beets did not occur, no increases in yields resulted from applications of borax. Broadcast applications as large as 80 pounds of borax per acre were not toxic to sugar beets in 1937.

2. It was shown that certain physiological disorders observed in sugar beets were the same as those described by Brandenburg and Kotila and Coons as heart rot caused by boron deficiency. A brief survey furnished indications that boron-deficient soils occur in localized areas in Michigan and in patches in the fields.

3. Increased yields of alfalfa resulted from applications of small quantities of sodium tetraborate. Some of the leaves of plants growing on boron-deficient soils turned red and bronze at the blossom stage. Within a few days after becoming red, the leaves turned yellow and soon died.

4. Boron deficiency symptoms in red and alsike clover were very similar to those on alfalfa. Greatly increased yields of alsike clover as a result of applications of sodium tetraborate were obtained. Earlier maturity resulted from such applications.

5. Sweet clover also responded to boron treatment. Pronounced yellowing occurred in sweet clover growing on boron-deficient sand, but the reddening of the leaves was less prominent than in the case of alfalfa and the common clovers.

6. No response was obtained from applications of sodium tetraborate to sand cultures planted to barley, beans, buckwheat, corn, oats, and rape.

7. In the field, boron deficiency in alfalfa occurred in patches and was particularly prevalent in the areas where heart rot of sugar beets was serious.

8. Where boron deficiency symptoms occurred in fields of mixed alfalfa and clover they invariably occurred on both crops.

9. A considerable aggregate area of Michigan soils is appar-

ently deficient in boron for sugar beets and the leguminous hay crops. A more detailed survey, accompanied by soil tests, will give more information regarding the extent of the area, and field research will be necessary before the economic seriousness of the deficiency can be determined.

# Bang's Disease

## Questions and Answers

**Reprinted from Pacific Rural Press**

*Kenneth G. McKay*

1. Can live culture be used on a pregnant cow without causing abortion?

Ans. *Some* will abort—per cent not yet known.

2. Will a cow react to blood test after given live culture and if so for how long?

Ans. Yes, one year or older for usually a period of two to three years.

3. Is it desirable to use live culture on heifers and if so at what age for best results?

Ans. No, unless heifers are in herds producing milk for pasteurization. See Farmers' Bulletin 1704 for conditions when it is advisable to vaccinate.

4. Is Undulant Fever in humans caused by using milk from a cow infected with Bang's disease?

Ans. Raw milk from infected cows is one of the causes of undulant fever.

5. If a sound cow was given live culture would she transmit Undulant Fever germs through her milk?

Ans. In some cases, yes.

6. Does the use of live culture tend to clean up cystic ovaries retained after birth and generally do away with trouble getting cows safe with calf?

Ans. No.

7. Does contagious abortion cause or aggravate mastitis?

Ans. Some cases of mastitis are caused by Brucella abortus. How frequent is not known.

8. Will live culture help or do away with that condition?

Ans. Prevents only by preventing general infection of cattle.

9. If you do not advise the use of live culture, can you recommend any other way to clean up a herd?

Ans. Yes, by segregation

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method supplemented by calf raising with eventual removal of reactors.

10. If you advise using live culture at all, is there any particular product that you advise using?

Ans. U. S. Govt. License product from laboratories that do not claim to cure the disease but only prevent it.

11. Why is live culture not generally used or recommended by the various state agricultural colleges?

Ans. Tends to retard cleaning up by blood test method. Dr. John R. Mohler says limit vaccination to immature heifers.

(1) Causes positive blood test.
(2) May sometimes cause abortion if injected into pregnant cattle and it is difficult to avoid this in the field.
(3) Not yet known if a danger to public health, therefore use only in beef cattle and non-lactating dairy animals or where milk and cream are to be used for pasteurization.

12. Can Bang's disease be controlled on an area plan basis?

Ans. In reply to a recent questionnaire the following 20 states report working on the area plan basis of control: Alabama, Delaware, Georgia, Louisiana, Michigan, Mississippi, Missouri, New Hampshire, New Mexico, North Carolina, Oklahoma, Oregon, Ohio, Pennsylvania, Tennessee, Utah, Virginia, Washington, West Virginia, and Wisconsin.

13. Is Bang's disease of economic importance?

Ans. A recent publication from the University of Missouri reports:

(1) Bang's disease reduces milk production 22.5 per cent.
(2) Bang's disease reduces the calf crop 40 per cent.
(3) Bang's disease-free herds calve every 11.5 months.
(4) Bang's infected herds calve every 20 months.
(5) One out of every five cows aborting will become sterile.

14. How long will a Bang organism live?

Ans. *"Experiments conducted by Dr. Hugh Stewart Cameron to determine the duration of viability of Brucella abortus showed that the organisms lived*:

(1) Four and a half hours when exposed to direct sunlight.
(2) Thirty days when kept in burlap sacking in an unheated cellar.
(3) One hundred and twenty-one days, the maximum interval covered, when dried in the presence of nutrient material.
(4) Seventy-two days when dried in the absence of nutrient material.

(5) Thirty-seven days in soil that dried slowly in test tubes kept in a laboratory cupboard.

(6) Sixty-six days, the maximum interval covered, after having been in wet soil in an unheated cellar.

(7) Four days in normal bovine urine kept at room temperature.

(8) One hundred and twenty days in bovine feces which were kept in test tubes in a laboratory cupboard or dried very slowly.

(9) One hundred days in bovine feces which were kept in an unheated cellar and did not dry.

(10) Seventy-seven days, the maximum interval covered, in presence of putrifaction

(11) Seventy-seven days in tap water which was sterilized before the organism was introduced and kept at room temperature.

(12) One hundred and fourteen days in tap water kept at a temperature approximating 4° C.

## Use Right Nail

THE strength of a nailed joint, unlike a bolted or riveted one, depends on the frictional contact of the nail with the wood fibers. Good nailing practice consists largely in selecting the proper kind, size, and number of nails to be used, say engineers at the U. S. Forest Products Laboratory, Madison, Wisconsin.

Use nails of proper length and wherever possible the nails should be long enough so that in soft woods about two-thirds of the length goes into the piece receiving the point. This means that the length of the nail should be at least three times the thickness of the outer piece. Where the thickness of the pieces does not permit this depth of penetration, a sufficient number of nails should be used to provide equivalent area of contact in the wood receiving the point.

If the wood tends to split badly use a thinner nail, blunt the point, or better still, purchase blunt-pointed nails. Use plenty of nails as the strength of the joint increases directly as the number of the nails.

Do not expect good nailed joints when using green wood that will later dry out. Nails driven into green wood that later dries out very commonly lose most of their holding power, therefore, use dry lumber. Nails are more efficient when driven into the side of dry wood then when driven into the end grain.

*Ohio Farmer*

# Two to Four More Pounds of Wool Per Ewe

Condensed from Sheep Breeder

*Tony Fellhauer*

Extension Livestock Specialist, Wyoming Extension Service

AN average increase in fleece weight per range ewe of 2 to 4 pounds may sound like a fairy story. To state that on an outfit of 40,000 range ewes the average fleece weight was increased slightly more than 2 pounds per ewe, or a total of more than 80,000 pounds per year, surely seems unlikely. Nevertheless, this is what happened in the case of the Warren Livestock Company of Cheyenne after seven years of culling and breeding work.

Many other sheep outfits have cooperated in culling demonstrations since Dean J. A. Hill initiated this type of wool improvement work more than 20 years ago. In addition to Dean Hill's work the livestock specialists and some county agents have followed through on culling demonstrations, and in every case after a period of 4 to 10 years there has been a very marked increase in average fleece weights. What is also very important, the fleeces were much more uniform in grade and longer of staple so that the clips are easier to sell and usually command a higher price. These results have been obtained so often that the outcome is not a matter of opinion or guess. If a sheepman has not been following a careful culling and breeding program, he can increase the average fleece weight of his flock from 2 to 4 pounds over a period of 4 to 10 years and make his clip more uniform, if he will follow our recommendations.

The first culling will invariably make a difference of at least 1½ pounds of wool per ewe between those culled and those left in the flock. The following is cited as an example. Wm. Kyne, wool grower in Hot Springs County, this spring began as a cooperator with county agent Louis Schilt. He desired to cull out 10 to 15 per cent of his less desirable ewes. Approximately 12 per cent, or 500 head, were marked for culling by Schilt. At shearing time the fleeces of 50 of the culled ewes, taken at random, and those of a representative group of 50 of the ewes left in the flock were weighed. The av-

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erage fleece weight from the culled ewes was 7.3 pounds, whereas from those left in the flock it was 10.2 pounds.

A record was kept of the results obtained in cooperation with Paul Dodd, a sheepman at Sheridan, who began with a small, non-descript band of ewes. Mr. Dodd desired to work toward a uniform medium grade of wool. Good Corriedale bucks were used. The results of the first four-year period were as shown in the table below.

| Year | No. Ewes | Av. Wt. Fleeces Pounds | Average Grade |
|---|---|---|---|
| 1928 | 437 | 7.2 | Fine to low ¼ |
| 1929 | 548 | 7.69 | Fine to ¼ |
| 1930 | 526 | 8.6 | Fine to ¼, mostly ½ to ¼ |
| 1931 | 754 | 9.01 | Mostly ½ to ¼ |
| 1932 | 984 | 10.54 | 30%, ¼; 44%, ⅜; 22%, ½ |

The average increase in grease weight was 3.34 pounds, or 1.14 pounds on a scoured basis.

The method used in culling is a practical one because it is rapid and a great deal of handling is not necessary. Before starting the job the owner is asked what percentage he wants culled out. The culling is done by what is known as the "touch system." A long narrow chute or runway is filled with a part of the ewes to be culled. The man doing the job then works rapidly through this group, grabbing a handful of wool on nearly the same location on the back of each ewe. At the same time he notes their general appearance and condition of the fleece. A chalk is used to mark the less desirable ones, so that they can be cut out later. An experienced culler can work over 1,000 ewes an hour by this system.

It sometimes happens that after the ewes have been marked for culling the owner for some reason, perhaps because he has no good market for those culled out or through neglect, fails to take them from his flock, in which case the effort has been for nothing. One way to overcome this and yet get the same result, except that it may take a few years longer, is to make a careful selection of the best ewe lambs in the fall for flock replacements. This can be done at the time the lambs are marketed so that the ewe lambs not to be kept can be sold with the wether lambs. It is well, however, to select a few more than will be needed, and then make final replacement selections in the late winter or spring, because it is

not so easy to do a good job with the younger lambs. This is the system that has been followed by the Warren Livestock Company. It makes the first selection of the fall. Then Dean Hill makes the final selection in the spring. This year about 6,500 ewe lambs were saved out of approximately 10,000. These 6,500 were cut down to 5,000 by Dean Hill, which is the number wanted for replacements. One can imagine how uniform these 5,000 head would be, particularly since this plan has been followed for seven years.

As a further encouragement to wool-improvement work, a number of wool schools have been held throughout the State. This year schools were held at Gillette, Buffalo, and Worland. Publicity has been and is continually being given to the results obtained in culling demonstrations. A 4-H demonstration on the subject, "Two to Four Pounds More Wool Per Ewe," has been prepared as an aid and suggestion to older sheep club members and club leaders. Sample circular letters on wool improvement are prepared for county agents. Wool exhibits at county fairs are encouraged. In cooperation with the United States Department of Agriculture and the wool department of the University a portion of the recently formed Weston county wool pool was graded by a Government grader.

Then, finally, the thing that will probably cause many sheepmen to follow a more definite culling and breeding program is the shrinkage and grade determination work by the United States Department of Agriculture and the University wool department. When a wool grower receives the report on his clip and it shows a great variance in grade, it is likely that this can be used to encourage him to do some improvement work. General educational and other similar efforts in behalf of wool improvement have their place, but the ultimate goal is not reached unless the grower as a result follows out either alone or with some assistance a definite improvement program. This is what we are attempting to get him to do.

# Keep Manure Piles Wet

**Condensed from The Michigan Farmer**

*R. L. Cook*
**Michigan State College**

WHEN manure piles are saturated with water, air is excluded and bacterial activity is at a minimum. As the piles become partially dry, aeration improves and the rate of bacteria decomposition increases rapidly. During decomposition, protein nitrogen is changed to the less stable ammonia compounds. Upon exposure to the air, these compounds break down and ammonia is lost as a gas. This decomposition with loss of humus-forming material and subsequent loss of nitrogen as ammonia gas is recognized on the farm as the "burning" of the manure pile.

Most farmers recognize this phenomenon but fail to make any considerable effort to check the decomposition and thereby save valuable organic matter and prevent the loss of nitrogen, the most costly ingredient of commercial fertilizers.

Perhaps the most effective way to cope with this situation is to spread the manure on the fields as fast as it is produced; but, for various reasons, this method is often impractical. Where that is the case, the use of manure pits or storage in the open yard becomes necessary. Such storage piles need not be a source of great loss if they are properly constructed and cared for. As the manure is being produced, the piles should be built broad and flat and not too high. They should, at the same time, be firmly packed. If cattle are allowed access to the pile, this is accomplished by tramping.

During the late winter and early spring months, when temperatures are low and precipitation is fairly high, the moisture content of a well-constructed manure pile is usually sufficiently high to prevent excessive burning, but as warm dry weather approaches this is not the case. An effort should be made, of course, to spread all the winter's accumulations on the fields before warm weather arrives. During the rush of a backward season, this is not always possible. As a result, many farmers find themselves with the crops planted and the winter manure pile still in the yard. On many farms,

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this manure cannot be hauled to fields until after harvest.

The question arises, "What can be done to preserve the material during the 60 to 90 days when under natural conditions decomposition would be at a maximum?" Just as water will quench an ordinary fire, so will water prevent the "burning" or decomposition of the manure. By keeping the pile saturated with water, air is excluded and decomposition cannot continue. It would be a simple problem on many farms to attach a hose to the water pipe from the windmill or motor-driven pump and apply the necessary amount of water. Care should be taken, of course, to apply only enough water to saturate the pile and not enough to cause plant food loss by leaching. Where the manure is in a concrete pit this danger is, of course, eliminated.

# Get More and Better Poults Per Breeder

Condensed from Turkey World

*E. Y. Smith*
Cornell University

MANY factors influence the fertility and hatchability of turkey eggs and, consequently, the number of poults produced per hen per year. The most important are the heredity of the breeding stock, feed and management of the breeders, care of the hatching prior to incubation, and incubator operation.

We are disregarding the operation of the incubator, because it is a special problem that requires special treatment. We are also disregarding the influence of the heredity of the breeding stock, except to say, in passing, that the heredity of the bird determines its potential capacities —beyond which it cannot go, regardless of how good the feed, care and management may be.

A study of the situation indicates that while some poult producers secure very fine results, others do not; hence, the average breeding hen throughout the country produces approximately only 11 poults during the breeding season.

From 1931 to 1936, the reports from many hatcheries in different parts of the country show that hatchability on an average ranges from 52 percent to 64 percent.

Records from breeders in New York state indicate that the

Reprinted by permission from the Turkey World, Mt. Morris, Ill., Feb., 1938

hatchability percentage of all fertile eggs set ranges from above 95 percent to almost 0 percent, and averages about 78 percent. However, one of these producers (with approximately 110 breeders) had an average hatchability throughout the season of approximately 93 percent, and produced better than 30 salable poults per breeding hen.

With poults ranging from 30 cents to 50 cents each, the difference in income between hens that produce 11 poults and 30 poults in a season is considerable.

Unless a breeding system of pedigreeing and progeny testing is being followed, cockerels and pullets are to be preferred as breeders to toms and hens.

The pullets start production as early in the season as the old hens (it is not unusual for April hatched poults to lay by the following November), and the eggs from the young breeders are highly in both fertility and hatchability; fewer hens are injured by the males in mating; the young culls make a better market carcass; and the young birds continue to grow; hence, are producing meat as well as eggs. Incidentally, this continued growth appears to be essential to the best production and hatchability.

Good results have been had from flock matings. When this practice is followed, blinds or hurdles should be placed near feeders and fountains to reduce interference by toms during the mating process.

Higher fertility will probably be had when the breeders are divided into pens with one tom for 10 to 15 hens per pen, and the toms rotated or moved from pen to pen daily. This usually prevents any danger from preferential matings, but has the disadvantage of decreasing the possibility of a check on the toms as breeders.

We believe and recommend that houses be provided for the breeders; however, it is not easy to justify this by either the results on breeding farms or controlled experimental data.

Ultraviolet and common lights have been used on turkey farms only during the last five to seven years. It has not been proven that the ultraviolet light has any advantages over a good grade of fish oil, plus the common artificial light.

Early egg production has been stimulated by the use of artificial lights on both practical breeding farms and experimental plants. The lights should be started at least a month before hatching eggs are desired, and a 13 to 14-hour day maintained. Since increased egg production causes an increased drain on the vigor of the bird, this should be counteracted by increased food

intake, if body weight is to be maintained or increased and the hatchability of the eggs kept up.

A good hatching egg is a fertile egg that contains in correct proportions all the proteins, carbohydrates, fats, minerals, vitamins and, in fact, all the nutrients (except oxygen) that are necessary for the life and growth of the embryo during the 28 days of incubation.

Breeders cannot lay eggs that contain the nutrients required by the embryo when they are lacking in the breeder ration. Such eggs will not hatch well because the germs are not able to live and grow during the incubation period on the inadequate ration supplied by the contents of the egg. Breeders that have been confined and wintered on grain alone cannot produce good hatchable eggs until after a more complete ration has been supplied in the spring, or until the spring grass, sunshine, bugs and the like, have enabled them to balance the ration for themselves. Feeding breeders a correct breeding ration enables them to store a balanced ration in the egg, which gives not only higher hatchability, but more rapid growth and better livability of the poults produced.

It is our experience that a ration adequate for a chicken hen may give fair—but not optimum —results when fed to turkeys in confinement. While their requirements may be similar qualitatively, they do differ quantitatively.

We cannot indicate all the qualitative or quantitative requirements of the breeder ration; the information is not available. But we do know enough of them to enable us to formulate a ration that gives excellent results as measured by present day standards.

The beneficial effect of milk, alfalfa leaf meal, green grasses or legumes, and other carriers of the growth-promoting and hatchability vitamins (riboflavin) has been repeatedly observed.

While milk is not essential to a good breeder ration, it is an excellent source of proteins, minerals and vitamins; and, when available in any form and at a reasonable price, should be used.

However, it should be remembered that the nutritive value of milk varies considerably — depending in part upon the nutritive value of the ration consumed by the cow producing the milk.

Work at Cornell, and elsewhere, shows that growing poults have higher requirements for protein, vitamins G, D, and probably others, than growing chickens. Observations on turkey breeding farms indicate the same for the turkey breeder ration as compared with chicken breeder ration. While approximately 230

units of vitamin G (per 100 lbs. of feed) are considered adequate for chicken breeding hens, careful observations indicate that more may be needed by the turkey hens.

The following feed ingredients are listed according to their relative potency in vitamin-G units.

| | Units of Vitamin G per gram |
|---|---|
| Dried pork liver | 100 |
| Dried yeast | 35 |
| Dried whey | 30 |
| Dried skimmilk | 20 |
| Alfalfa meal, dehydrated | 16 |
| Alfalfa meal | 11 |
| White fish meal | 10 |
| Sardine fish meal | 7 |
| Meat scrap | 6 |
| Menhaden fish meal | 5 |
| Wheat germ | 4 |
| Soybean oilmeal | 3 |
| Wheat middlings, standard and flour | 2 |
| Wheat bran | 2 |
| Wheat red-dog flour | 1 |
| Yellow corn | 1 |
| Wheat, hard and soft | 0.5 |
| Barley | 0.5 |
| Buckwheat | 0.5 |
| Oatmeal | 0.5 |
| Oats | Trace |
| Corn-gluten meal | 0 |

(Cornell Bulletin No. 660)

Vitamin D is essential in a good breeder ration. A lack of an adequate supply of it may cause warping or twisting of the keel, beading of the ribs or other signs of rickets, decreased egg production, increased numbers of soft-shelled eggs, poor hatchability, and a tendency on the part of the poults hatched to show signs of rickets (especially should the growing ration be deficient in vitamin D), followed by high mortality.

Since fish oils are so variable in their vitamin-D potency, only oils known to be up to U. S. P. Standard for vitamin-D potency (85 U. S. P. units per one pound of oil) should be used. Two pounds of this fish oil or an equivalent in a concentrated or fortified oil should be used to supply adequate vitamin D in the breeder mash.

While other known vitamins are also essential in a breeder ration, vitamins G and D are probably the two most often deficient in ordinary rations at the present time.

While vitamin A is rapidly lost when stored under average to high temperatures, freshly ground feeds containing relatively large amounts of yellow corn and alfalfa leaf meal should contain adequate amounts of the vitamin.

Vitamin E (the fertility vitamin) is essential for good fertility; but ordinary rations of whole or non-degerminated cracked grain, plus a regular mash in which the cereal portions are non-degerminated and freshly ground, are supposed to carry adequate amounts of this vitamin to supply all requirements.

Recent work by Gallup and Norris, Cornell, have shown the

necessity of manganese in the breeder, as well as the growing, ration. Its function in the growing ration is to increase growth and decrease the amount of perosis. In the breeder ration it stimulates growth (with young breeders), egg production, fertility (slightly), and hatchability.

While it seems practical to add about one-fourth pound of manganese sulfate per one ton of ordinary growing mash, the average breeder ration containing liberal amounts of alfalfa, wheat and wheat by-products, is probably adequate. However, in the lack of definite information, it can be added to the breeder ration to give a wider margin of safety. Certainly, it will produce no ill effects.

In formulating a breeder ration, both the initial cost per unit of feed and the efficiency of the ration should be considered. However, with poults selling at their present prices, the efficiency of the ration is of more importance than the initial cost of the ration.

The difference in income between 30 and 11 poults at 30 cents to 50 cents per poult, will buy enough feed to keep a breeder hen for a long, long time.

There are many good turkey feeds available. Those wishing to mix their own feeds can obtain tested ration formulas from state agricultural colleges or from the U. S. Department of Agriculture. Commercial feeds manufactured by well-known feed companies are very satisfactory. Many commercial concentrate feeds are available for those who wish to use their farm raised grain to the best advantage.

Regardless of the source of the feed, the breeder mash and a good grain mixture should be kept before the breeders at all times. Oysters shell or crushed limestone and grit should be readily available in separate hoppers.

Hatching eggs contain living germs that must be kept alive and should be kept dormant after they are laid until the reawakening by the stimulating effect of the incubator heat.

Adverse conditions prior to incubation will ruin many eggs this year.

The following practices, if followed, may save you money.

(1) Prepare one deep nest with 4 or 5 inches of clean, dry nesting material for each four or five hens. This will reduce the breaking and soiling of the eggs.

(2) Gather the eggs three or four times a day to prevent freezing; also to prevent breakage and continued heating by other hens.

(3) Store in a clean, draft-proof, well-ventilated room with a constant temperature around 50 or 60° F. and a relative humid-

ity of about 60 percent to 65 percent.

(4) Turn the eggs once a day after the third or fourth day.

(5) When the eggs are cased, they may be turned by turning the whole case.

It is advisable not to hold eggs more than a week or ten days. However, the environment conditions under which they are held are of more importance than the length of time held.

More than 80 percent hatchability has been had from eggs held as long as 30 days under correct holding conditions.

## Oats in Hoppers

MANY poultrymen have found that it is a good plan to feed whole oats in hoppers in addition to whatever other grain and mash is fed to layers. They have found that it helps to prevent feather pulling and cannibalism, and seems to help generally in keeping the birds in good condition.

*Am. Poultry Journal*

# Planting of Wrinkled English Peas

**Condensed from Southern Agriculturalist**

*Floyd Bralliar*

THERE has been a tradition widely believed among American gardeners that it is not safe to plant large wrinkled English peas until the ground has pretty well warmed up. For this reason most Southern gardeners grow very few wrinkled English peas. Almost everyone is aware of the fact that the wrinkled varieties are very much superior in quality to the smooth-seeded varieties, that they produce a much finer looking pod which contains more peas and that the individual peas are nearly twice the size of the green peas of the smooth-seeded varieties, yet they do not plant them, for if they wait until the weather is warm enough to plant these peas, it will be too hot for the peas to mature.

We have recently completed a series of experiments with more than 50 varieties of peas now on the American market and these included most of the wrinkled-seeded varieties that are on the market today. As a result, we have come to the conclusion that at least in Tennessee, the wrinkled-seeded varieties can be planted just as early as the round smooth-seeded varieties, that they will withstand as much wet, cold weather before they come up as the smooth-seeded varieties will stand, and that once they have come up, they will withstand just as heavy freezes as any of the smooth-seeded varieties with the exception of Canadian Field peas and the Austrian Field peas. We have proved from our own experience that the wrinkled varieties will stand a temperature as low as 15 above zero without serious damage even though this temperature may last two or three days, and we know of no smooth-seeded varieties that will withstand more cold than this.

Our findings have been recently verified by a three-year experimental test carried on by the Illinois Agricultural College at Urbana. Their reports received within the last two or three weeks state that with them, the wrinkled peas are not only as hardy as the smooth-seeded varieties, but they will actually withstand more cold, both before they come up or after they have come up. We hope this information will encourage many of our readers to plant wrinkled peas in their own garden early this spring for their own use.

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# Short Cut in Liming

Condensed from Capper's Farmer

*J. Will Thompson*

"THERE'S the way to lime," said A. T. Trimble as a truck roared past the farmstead in Crawford county, Illinois. "That fellow has a job down the road. He has two endgate spreaders on the truck, drives into a field, throws the machinery into gear, two helpers shovel out the stone and he never stops going.

"The farmer has 2 to 4 tons of lime an acre, according to the rate desired, on his ground when the truck heads out into the road again. That outfit and crew will lime up to 25 acres a day, if the haul is not too great, and the farmer in the meantime goes about his regular work.

"We buy the stone. The trucker owns the equipment and furnishes the service. It makes a good combination, lowers the cost of sweetening soil and eliminates a lot of backache. Under the old system, stone had to be handled as many as 5 times. This way there are only two, from railroad car or crusher to the field."

Such liming service has been established in several Illinois and Indiana counties, either by cooperating farmers or by private enterprise. Roy H. Thoman, Fayette county, Illinois, used that method in preparing land for sweet clover, which was seeded with Korean lespedeza. The two crops are grown in a soil improving rotation.

The speed with which the service functions is illustrated by a report made by L. B. Miller, Illinois College of Agriculture. Five men, using equipment designed by D. E. Mullen, Champaign county, spread a 70-ton carload of ground stone each of three consecutive days. The operation included unloading at the siding, a truck haul of 2½ miles and the actual spreading.

From 10 to 12 minutes, only, were required to distribute a 5-ton load at the rate of 2½ tons an acre. That meant two acres treated every trip. The truck was equipped with a power dump body which facilitated unloading into the trailer type spreader, altho some shoveling was necessary.

In addition to the truck crew of driver and two shovelers, there were two men at the siding to unload stone from the cars. To

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avoid delay in loading the truck, an elevated hopper was provided. Into this the two men shoveled stone while the other three were gone to the field. The hopper was high enough to clear the truck body and was equipped with a simple trapdoor thru which a 5-ton load poured out within a few minutes. The hopper was mounted on skids so it could be pulled to a new position alongside the car or to another car by the truck. Mr. Mullen spread 500 tons of stone on 200 acres with that equipment and crew in one summer.

Marion File, Bond county, uses the truck and spreader method for both phosphate and limestone. In that section raw rock phosphate is the accepted application. He is following a rotation which includes 2 years of corn and a year of sweet clover. Even on bottom land, the phosphate applications are considered necessary, about once in 10 years. To insure a vigorous stand of sweet clover and alfalfa, liming is necessary more frequently, probably once in 5 years even tho a test shows neutral.

He uses a tractor as auxiliary power in applying lime. Stone is hauled by truck to the field, a whirlwind spreader is attached behind and the tractor hitched on in front. Only a few minutes are required to scatter a 5 ton load.

Largely because of the reduced cost of this plan of liming, increased activity in soil sweetening is reported in regions where it is used. Under the old process, stone was unloaded at sidings into bins, later hauled to the field and dumped in piles at the edge of the field. Finally it was again loaded into wagons or spreaders for distribution over the field. It was a laborious process.

Usually the farmer selected a time when other work was not pressing, late summer or early fall, for his liming. Sometimes he could assemble enough equipment thru help of neighbors to unload a car and haul it directly to his farm, and thus avoid one handling. But on such occasions he rarely attempted spreading.

The process was so slow that rain which muddied roads or softened fields might seriously interfere with his work. Under the newer arrangement, one good day will enable him to lime 25 or 30 acres, spread a carload. And if custom service is available in the community liming may not interfere with anything else he may have to do when the car arrives. In some places the service has resulted in a longer liming season. Applications are extended into winter when the ground is frozen. Big loads and quick trips with motor trucks have broadened the radius over which limestone haulage may be profitable.

# Feeding and Fattening Hogs

Condensed from The Rural New-Yorker

*R. W. Duck*

WHENEVER a group of livestock men get together almost invariably someone will make the remark that they once had a certain individual which was a marvel for her ability as a producer or reproducer. Breed, grade or type is seldom mentioned—it was the individual which stood out in memory and performance. Very often the female discussed was of indiscriminate breeding, and may or may not have had the physical characteristics of any one breed.

Most breeds were started from foundation females of such noted performance. It was observed by the more progressive early day breeders that certain boars or sows were not only exceptionally desirable individuals themselves, but also produced superior offspring with regularity and consistency. Breeds thus became established and associations formed with duly elected officers, to record such eligible individuals, so that by successive registrations the breeding could be traced through all the lines of descent.

No group of livestock has been more subject to market changes and demands that the various breeds of hogs. Due to their rapidity of gain and increase they are especially suited to make such changes in a breeding program. Not so long ago "fatbacks," "clear-bellies" and lard sold at prices which warranted the production of lard hogs of an extremely chuffy type, with early maturity and rapid fattening. With a change in the food demands of the consuming public it became necessary to breed barrows which carried a higher proportion of lean, cut a small chop, and carried a higher percentage of quality loin and ham. From a breeding consideration the old chuffy type sow had also become a burden; they farrowed small litters and many of these failed to survive due to inherited weakness and the fact that such sows were poor mothers. Their short, light boned legs and weak pasterns could not adequately carry their weight, many pigs were smothered, and the breeding efficiency of the sows themselves was relatively short lived.

*Pioneers and Pork*

The use of pork and pork products in America was a suc-

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cessful contributing factor in the settlement of our continent. Whenever pioneers pushed westward they invariably took with them some hogs to supply needed fresh and cured meat. No other kind of meat lends itself to such a wide variety of uses or is so easily cured. We thus became the greatest pork consuming country in the world.

As early as 1818 pork packing was a well-established industry at Cincinnati, Ohio. In 1833 some 85,000 were slaughtered and packed there, while 10 years later the number had increased to over one-quarter of a million head. Hogs of those days were fed almost exclusively on home-grown grains, principally corn, and were required to do considerable foraging, the lush pastures and meadows supplying needed variety, nutrients, minerals and vitamins to produce a firm pork of excellent quality. Corn had taken its place as the great American grain through the central western area, which became known as the Corn Belt. Corn-fed hogs were synonymous with a sweet, tender, firm, juicy excellent quality pork product. No other pork could successfully compete with it either in cost of production or in quality of the finished product. Corn-fed American pork dominated the markets; American farmers should strive to keep it so.

*Soft Pork*

The early American packers did not know the meaning of soft pork, because corn and pasture produced a firm pork of excellent quality. It was not until peanuts, Soy-beans and some of the various grain by-products came into extensive use as feeds for fattening hogs that soft pork became a serious market problem. Soft pork liquefies at ordinary room temperature, quickly becomes rancid and presents a smeared slimy appearance which makes its commercial use and sale greatly depreciated. It is, therefore, one of the most serious problems in commercially packing pork. In certain areas, particularly in the South where peanuts are fed extensively, it has resulted in producing so many soft pork carcasses that packers discriminate against and classify all hogs received from these sections as soft. Some Soybean sections are also discriminated against.

One of the most important and significant experimental tests conducted in recent years relative to feed influences on the production of soft pork was reported on at the 1937 meeting of the American Society of Animal Production. It covered work conducted by Wiley, Vestal and Shrewsbury of the Indiana Station relative to the relation of hominy feed to soft pork pro-

duction. The tests were conducted in co-operation with Kingan & Company at their Indianapolis plant.

The rations used were self-fed and consisted of yellow corn with comparative groups, and white and yellow hominy feed in two other groups. All hogs received 60 percent tankage and minerals with these basal rations. The white hominy feed contained an average of 7.4 percent fat, the yellow hominy feed 8.1 percent, and the shelled yellow corn 4.36 percent, for the two lots receiving corn. The following relation between the refractive index of the back fat and the firmness of the carcass was established: Hard, 1.4597 and below; medium hard, 1.4598 to 1.4601; medium soft, 1.4602 to 1.4605; soft, 1.4606 and above.

When graded the chilled carcasses of the corn-fed hogs were all hard except one which graded as medium hard, while the hominy-fed hogs all graded varying degrees of soft with the exception of one carcass which graded medium hard. The report on the hams and bacon was as follows: "In the first experiment there were two hard, six medium and eight soft bacons from the corn lot; and one medium and 15 soft bacons from the hominy lot. The corn-fed hogs in this experiment produced 11 hard and five medium hams. Those receiving hominy feed produced one hard, 13 medium and two soft hams. In the second experiment there were 11 medium and one soft bacons produced from corn, and six medium and six soft from hominy feed. The hams in this experiment graded 11 hard and one medium in the corn-fed lot, and 12 hard in the hominy lot. As was the case in many of the earlier tests on firmness in hog carcasses and cuts, the smoked hams showed more firmness than the bacon."

The back-fat of the hogs on these tests as indicated by their respective refractive index figures gave definite proof of the softening effect of hominy feed as used in the hog rations. Some of the refractive index figure reports on the backs of the hogs fed hominy feed were sufficiently high to indicate an oily carcass.

Relative to gains produced the figures obtained show that hominy feed was equal to corn in efficiency and economy of gain. The average of the two trials required 364.7 pounds of corn and about the same amount of hominy feed to produce 100 pounds of gain in each group. It also required an average of about 27 pounds of tankage supplement in addition. The average daily gain for all hogs was 1.7 pounds per head.

It will be noticed that some soft hams and bacon were pro-

duced even in the corn-fed groups. Tests at other stations have shown that some strains of hogs are more susceptible to the production of soft pork than others. This brings up the important commercial consideration that to eliminate the production of such undesirable carcasses the breeding program must be studied and matings made based on selections from individuals whose offspring produce only hard pork if fed rations which are conducive to the production of such carcasses.

*Molasses Mixture and Minerals*

Thompson's recent work at the Oklahoma A. and M. College on the utilization of blackstrap molasses as a substitute for corn in fattening rations for hogs is of interest and value due to the increased use of molasses as a commercial fattening feed. The results of this investigational work were also reported at the last meeting of the American Society of Animal Production.

One group was fed a basal ration of equal parts corn and shorts, with free access to salt. Another group received the same feed ration, but was allowed free access to a mineral mixture consisting of equal parts salt, bonemeal and ground limestone. The salt supplement group required 276 pounds of corn and a similar amount of shorts to produce 100 pounds of gain; those receiving the mineral mixture mentioned required 44 pounds less corn and 45 pounds less shorts to make a corresponding gain. The saving in feed cost per cwt. gain was $1.77 in favor of the mineral mixture hogs.

Another group was fed corn 25, shorts 55, and molasses 20 percent, plus access to the mineral mixture. They required 122 pounds of corn, 262 pounds of wheat shorts, and 98 pounds of molasses for each 100 pounds of gain made, and reduced the feed cost for such gain 61 cents below the corn-shorts-mineral mixture group. A fourth group was fed wheat shorts 60 percent and molasses 40 percent, plus salt. They required 303 pounds of shorts and 202 pounds of molasses to produce 100 pounds of gain at a reduced feed cost of 53 cents per cwt. gain under the previous group. It will be noted their total feed requirement was greater, but cost of gain was lowered due to the lower feed cost of molasses. Another group was fed the same proportion of shorts and molasses supplemented with the mineral mixture. They required only 295 pounds of wheat shorts and 196 pounds of molasses to produce 100 pounds of gain at a total feed cost of $7.91 per cwt., which was 22 cents less than the shorts-molasses-salt group. The cost of the feeds used

per cwt. was: corn $2.05, wheat shorts $1.95, molasses $1.10.

*Limited and Full-Feeding*

Very often when good pasture or forage is available pigs are not fed sufficient supplemental grain to make maximum gains. This means that to attain a given market weight they must be fed for longer periods of time, and usually finished off in dry-lot after the pasturage or forage is gone. The question of markets enters into this problem as well as cost of gains made.

Recent work by Aubel of the Kansas State College shows that it required 328 pounds of corn, self-fed on Alfalfa pasture, and 13 pounds of tankage to produce 100 pounds of gain, with initial weight pigs of 60 pounds, fed for 105 days, to an average weight of 218 pounds. Another group of similar initial weight was limited to one pound of corn per head daily for a comparable period, plus tankage supplement. Their weight, after 105 days of feeding, averaged only 115 pounds. It required 60 days additional feeding in dry-lot to bring them to a market weight of 238 pounds. Their average feed requirement per 100 pounds of gain was 335 pounds of corn and 19 pounds of tankage. New corn was used for the dry-lot feeding period as contrasted to old corn used while on pasture.

The relative costs of new and old corn, as well as the fact that the full-fed pigs were ready for market two months earlier than the limited-fed pigs would be the determining factors in profit or loss with the groups. The prices would be somewhat variable, and need be determined by the individual feeder. Availability would also enter into the problem. It would seldom be profitable to purchase old corn at market prices to full-feed, however, if the corn was home-raised and available, the attained results show it would in general be more profitable to full-feed hogs on pasture. In no case is it advisable or profitable to let any fattening animal, whether it be hog, steer or lamb, lose weight and finish during the Summer or Fall, as later gains are invariably attained at lowered efficiency and consequent increased cost.

# New Techniques in Standardization

**Condensed from The Agricultural Situation**

*C. B. Sherman*

SCIENCE, technology, and ingenuity have combined to further the refinement and accuracy of the farm products standardization and grading work of the Bureau of Agricultural Economics. It is true that many of the standards are still more or less empirical; that the grading of some commodities rests to a considerable extent upon the expertness of the grader. But real progress has been made in substituting exact mechanical, chemical, and other tests and devices for the human judgement and skill that involve human variations.

Whereas in previous years it was often necessary to describe a factor of quality in rather general terms, it is now possible to give it a specific value. Where expert estimation was formerly used there are now apparatus or tests that measure exactly. In some methods of grading that are still the same in general outline, certain steps of procedure heve been perfected by new apparatus, tests, or methods.

Extensive and intricate apparatus are being used in the Bureau's cotton standardization laboratories. Here the rooms are equipped with special skylights, and subjected to practical or complete air conditioning and to humidification before they are considered suitable for the standardization work.

Among the pieces of special laboratory equipment more readily understood are an improved cotton-fiber sorting machine that permits the measuring of fiber lengths with a high degree of accuracy, a bundle fiber test for strength of cotton fibers, and an improved cotton-waste analyser that separates the different elements in that waste for intensive study.

Quality factors of the strictly perishable fruits and vegetables seemed at first to defy mechanical apparatus. Now a saccharimeter is used to determine the sugar content of grapes, a sugar acid test is made to learn the maturity of citrus fruits, and the specific gravity test is used to learn the maturity of cantaloups in the States that have laws prohibiting the shipment of immature melons.

Penetrometers ascertain the consistency of certain canned

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products such as canned pumpkin, hydrometers test the density of sirups, salinometers test brine solutions, and a fruit pressure tester to ascertain the maturity of canned peaches and pears is in process of development.

Color is an important quality factor in several agricultural commodities. For years it was an elusive and baffling element. The color of cotton, for instance, ranges from creamy whites to flat whites and from blue-stained through gray, spotted, yellow-tinged to deep yellow-stained. These differences affect the utility and the prices of the cotton. It was believed that these colors were not altogether stable—that further bleaching and yellowing may take place.

Notable progress has now been made in developing techniques and apparatus for measuring color in a practical way. The technicians are studying changes in cotton colors and the conditions or combinations of conditions that are likely to bring about these changes. Degrees of color are quality indicators of commodities as far apart as hay and canned tomatoes.

Grain standardization and grading work has produced many official inventions. Ten public-service patents have been issued to Bureau workers in this field alone—patents that allow the invention to be manufactured and used by the people without the payment of any royalty.

Devices include the so-called Boerner sampler for determining the test weight per bushel of grain—one of the chief grading factors. In grading grain for export, the public-patent ship sampler takes complete cross-sections from the falling grain as it leaves the delivery spout for the hold of the ship, so that several samples, when combined, accurately represent a shipment of grain. A standard method of determining the protein content of wheat has been developed and is now in use.

The new techniques and devices in standardization work relate both to the formulation of standards and to their practical application through grading and inspection. Some, by measuring more factors, make it possible to increase the comprehensiveness of a standard. Some increase accuracy in formulation and in application. Some make for uniformity among the workers. Some save time in procedures. All contribute toward progress in improvement which is the hall mark of the standardization work of this decade.

# Cover Crops for Orchards

**Condensed from American Fruit Grower**

AS with many other questions having to do with fruit production problems, the matter of cover crops is one that changes from section to section. In southern orchards sudan grass and soybeans give excellent foliage production as a combination summer cover. This summer combination is followed by rye and vetch for over-winter.

While this system has been tried and proved in the South, a visit to northwestern orchards in search of cover crop practices would probably result in discovery that alfalfa is a popular permanent or semi-permanent cover, made popular because of its ability to last year after year and for other characteristics which are described in subsequent paragraphs.

Still other growers would easily be found who are using rye grass as a winter cover and cultivating during the summer. Then in another section, such as New York, it is apparent that orchardists are mainly following a sod or sod mulch system.

But interspersed through every fruit area one is likely to find any one of these soil management methods in use. Diversity of types, combinations, and methods is the rule rather than the exception when applied to orchard covers.

During the past few years a long list of cover crops have been on trial. Many have appeared only in experimental plots, to be discarded later for any one of a dozen reasons. Through this constant experimentation and actual usage by orchardists, there has survived a group of crops that appeared destined for constant planting in the nation's orchards. These are sharply divided into two classifications—legumes and non-legumes, summer and winter. To be separated, too, are the permanent covers, like alfalfa, from those which last only a summer or winter season.

Popular summer covers include the grains, sudan grass and the annual legumes. Those frequently used for winter are alfalfa, vetch, and rye grass. Through conversion of nitrogen from the air into soil nitrates by bacteria which collect in nodules on their roots, the legumes act as conditioners of soil chemical properties as well as providers of green manuring. But among the non-legumes are some of the

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most popular cover crops, heavy yielders of valuable mulch and green manure for turning under.

While some of the newer cover crops have been especially popular in the South, namely, crotalaria, lespedeza, and Austrian peas, their use has been mostly sectional. Lespedeza, in particular, has performed well for many growers. Where introduced in mid-northern areas crotalaria, a legume first tried in Florida, has produced heavy growth. However, this crop needs a long growing season and should be planted early in northern sections at the rate of 10 pounds of seed to the acre.

Selection of a cover crop should be made entirely on its ability to grow abundantly in any given locality. Legumes are preferred, but if they do not grow well, it is better to use non-legumes, supplementing them with nitrogen or complete fertilizers.

A popular perennial legume is alfalfa in sections where it does well. By growing deep roots, this plant is able to better endure drought and when once established, annual or biennial reseeding is unnecessary since it lasts for several years. One Indiana grower planted alfalfa in his orchard when it was three years old. Today, the orchard, now 14 years old, is growing and producing well and the original alfalfa is supplying an abundance of organic matter. This illustrates a use of alfalfa as grown in many orchards—that of a permanent sod type of cover. Ten pounds of alfalfa seed per acre gives a good stand.

Particularly adapted to light loam or sandy soils, winter or hairy vetch will usually cover the ground before winter when planted in late summer or early fall. It grows in cool weather, forming a mat over the soil. A combination of vetch with rye, rye grass, or oats has proven an excellent cover, particularly for overwintering. Using 15 pounds of winter vetch and 15 pounds of rye grass to the acre on a sandy soil, an Ohio grower reports that he secured good cover.

Growth is turned under in mid-spring, preferably before spring rains stop so that as much moisture as possible is carried into the soil with the crop foliage. If the fall planted vetch is not turned under before summer it will partially reseed itself and a volunteer stand may be grown the following year. This system, however, usually results in poor, uneven stands, so annual reseeding is recommended wherever possible. Where used alone vetch is seeded at the rate of one-half to one bushel an acre.

Another legume which makes a good semi-permanent or permanent cover in orchards is bi-

ennial white clover. It will do well on soils too poor for alfalfa.

Crimson and red or mammoth clovers have given good results where it is possible to obtain healthy stands. Red clover is sown at the rate of 12 to 15 pounds per acre and crimson clover 15 to 20 pounds.

Soybeans and cowpeas have enjoyed greater popularity in southern areas than in the North because they kill at first frost. Per acre seeding for soybeans is one to one and one-half bushels; for cowpeas, one and one-half to two bushels.

Rye, wheat, barley, and oats are often planted as pure stands or mixed with vetch. Being non-legumes, these crops do not add to the soil nitrogen supply, but are helpful for preventing erosion, snow drifting and for increasing organic matter content. Best seeding of these grains is one and one-half to two bushels per acre.

Principally because it is a good producer on poor soils, buckwheat, a non-legume, is frequently used to improve soils so legumes can be grown. Although killed by the first frost, it is a good conditioner for heavy soils. A bushel to the acre gives good stands under most conditions.

In young orchards where no shading occurs, millet makes an excellent cover. It produces a large bulk of organic matter on a variety of soils. From 25 to 40 pounds of seed are usually sown per acre.

Dwarf essex rape and cow turnips, besides having large root systems which penetrate deeply into the soil, grow late in the season and form an abundance of foliage for plowing under. Three to four pounds of these seeds are sown to the acre.

After orchard cover crop seedbeds have been prepared, drilling is the most satisfactory method of seeding. It distributes the seed more evenly and places it at a more uniform depth.

Since abundant foliage production is desired for any cover crop, it may be necessary to fertilize for maximum growth. For legumes, liming is needed if soils are acid. Inoculation should be practiced if best results are to be obtained with the legumes. In trials at a midwestern experiment station, 1575 pounds an acre of an air dried hay were obtained in an orchard where no fertilizers had been applied between the trees. Where 200 pounds of cyanamid per acre had been broadcast, the acre yield was 4000 pounds. Relatively slight added cost, this experiment shows, can result in more than doubling humus production of cover crops.

# Extra Milkings

MILK an extra time every day and your cows will reciprocate by filling your can a fifth fuller. This is what tests show which were conducted at the Iowa State College dairy farm on the effect of times milking per day on milk yield. Without any change of feed or management, an extra milking per day will result in about 20 percent more milk.

Whether farmers can afford to milk their cows more than twice a day will depend upon the ratio of the price of milk to the extra-labor cost, C. Y. Cannon, head of dairy husbandry, Iowa State College, suggests. If labor is high in value and milk low in price, it would undoubtedly not be economical to milk cows more than the customary morning and night milkings. This condition probably prevails on many Midwest farms. In addition, the extra milking much of the year would likely come during the hours usually devoted to field-work.

Tests have shown that greatest amount of milk is secreted immediately after the udders are empty, and that a proportionally decreasing amount is secreted in the hours that follow before the next milking.

*Successful Farming*

# The Breed Associations

**Dairy — Beef — Hogs — Sheep — Horses**

### Dairy Breeds

The Holstein Friesian Association of America, W. E. Norton, acting secretary, Brattleboro, Vt.

The American Guernsey Cattle Club, Karl Musser, secretary, Peterboro, N. H.

The American Jersey Cattle Club, Lewis W. Morley, secretary, 324 West 23rd St., New York.

The Ayrshire Breeders' Association, C. T. Conkin, secretary, Brandon, Vt.

The Brown Swiss Cattle Breeders' Association, Ira Inman, secretary, Beloit, Wis.

The Dutch Belted Cattle Association, R. E. Swartz, secretary, Buchanan, Mich.

### Beef Breeds

The Aberdeen-Angus Breeders' Association, W. H. Tomhave, secretary, Union Stock Yards, Chicago, Ill.

The American Hereford Cattle Breeders' Association, R. J. Kinzer, secretary, Kansas City, Mo.

The American Shorthorn Breeders' Association, F. W. Harding, secretary, 7 Dexter Park Avenue, Chicago, Ill. After December 1 the new secretary will be H. J. Gramlich, same address.

American Galloway Breeders' Association, Margaret Coridan, secretary, Union Stock Yards, Chicago, Ill.

The American Polled Hereford Association, B. O. Gammon, secretary, Des Moines, Ia.

Polled Shorthorn Society, Miss Emily Krahn, secretary, 13 Dexter Park Avenue, Chicago, Ill.

The Milking Shorthorn Society, Roy Cook, secretary, Independence, Iowa.

The Red Polled Cattle Club of America, F. A. Sloan, Burchard, Neb.

The American Devon Cattle Club, W. J. Neal, secretary, Meredith, N. H.

### Horse Associations

The Morgan Horse Club, F. B. Hills, secretary, 90 Broad St., New York.

The American Shetland Pony Club, Julia M. Wade, secretary, LaFayette, Ind.

Percheron Society of America, Ellis McFarland, secretary, Union Stock Yards, Chicago, Ill.

American Shire Horse Association, J. G. Truman, secretary, Bushnell, Ill.

American Clydesdale Association, Margaret Coridan, secre-

tary, Union Stock Yards, Chicago, Ill.

The American Suffolk Horse Association, Mrs. Veva Roberts, secretary, Bushnell, Ill.

The American Association of Importers and Breeders of Belgian Horses, J. D. Connor, Jr., secretary, Wabash, Ind.

The Arabian Horse Club of America, H. S. Gregory, secretary, Berlin, N. H.

The American Trotting Register Association, W. Gahagan, secretary, Goshen, N. Y.

American Breeders Association of Jacks and Jennets, Wm. E. Morton, secretary, Kansas City, Mo.

The Jockey Club, Fred J. E. Klees, secretary, 250 Park Ave., New York.

American Saddle Horse Breeders' Association, C. J. Cronin, Jr., secretary, Louisville, Ky.

American Hackney Horse Society, Gurney C. Gue, secretary, Merrick, L. I.

The Palomino Horse Association and Stud Book Registry, Dick Halliday, secretary, El Ranchito, Ojai, P.O., Calif.

The Welsh Pony and Cob Society of America, Julia M. Wade, secretary, Lafayette, Ind.

Tennessee Walking Horse Breeders Association of America, Burt Hunter, secretary, Lewisburg, Tenn.

### Sheep Organizations

American Hampshire Sheep Association, Helen Tyler Belote, secretary, 72 Woodland Avenue, Detroit, Mich.

American Leicester Breeders' Association, A. J. Temple, secretary, Cameron, Ill.

The American and Delaine-Merino Record Association, Gowdy Williamson, Xenia, Ohio.

American Shropshire Registry Association, Julia M. Wade, secretary, Lafayette, Ind.

American Corriedale Association, Fred S. Hultz, secretary, Laramie, Wyo.

National Lincoln Sheep Breeders' Association, Mrs. D. T. Knight, secretary, Marlette, Mich.

American Cheviot Society, W. A. Curry, secretary, Hartwick, N. Y.

American Southdown Breeders' Association, W. L. Henning, secretary, State College, Pa.

The Continental Dorset Club, J. R. Henderson, secretary, Hickory, Pa.

The American Oxford Down Record Association, J. M. McHaffie, secretary, Clayton, Ind.

The American Rambouillet Sheep Breeders' Association, Mrs. Dwight Lincoln, secretary, Marysville, Ohio.

American Cotswold Registry Association, F. W. Harding,

secretary, Union Stock Yards, Chicago, Ill.

National Delaine Merino Sheep Breeders' Association, I. Y. Hamilton, secretary, Houston, Pa.

American Romney Breeders' Association, H. A. Lindgren, secretary, Corvallis, Ore.

National Corriedale Sheep Association, Pure Bred Live Stock Record Building, Union Stock Yards, Chicago, Ill., Mrs. F. J. Moline, secretary.

National Suffolk Sheep Association, Pure Bred Live Stock Record Building, Union Stock Yards, Chicago, Ill., Mrs. F. J. Moline, secretary.

American Suffolk Association, C. W. Hickman, secretary, Moscow, Idaho.

Karakul Fur Sheep Registry, Mrs. F. J. Moline, secretary, Record Building, Union Stock Yards, Chicago, Ill.

### Hog Associations

United Duroc Record Association, B. R. Evans, secretary, Peoria, Ill.

Hampshire Swine Record, E. M. Harsch, secretary, Peoria, Ill.

American Poland China Record Association, Geo. W. Davies, secretary, Union Stock Yards, Chicago, Ill.

The O. I. C. Swine Breeders' Association, O. C. Vernon, secretary, Goshen, Ind.

The American Berkshire Association, C. W. Mitchell, secretary, Springfield, Ill.

Chester White Record Association, L. P. Moore, secretary, Rochester, Ind.

Standard Poland China Record Association, F. L. Garrett, secretary, Maryville, Mo.

National Spotted China Record Association, F. L. Obenchain, secretary, Bainbridge, Ind.

The Yorkshire Hog Breeders' Association, H. G. Krum, secretary, 1391 Capital Avenue., St. Paul, Minn.

The Tamworth Hog Breeders' Association, W. F. Barr, secretary, Ames, Ia.

### Goat Associations

The American Milk Goat Record Association, Will L. Tewalt, secretary, Vincennes, Indiana. This association registers all breeds of milk goats.

### Rabbits

American Rabbit and Cavie Breeders, 7408 Normal Avenue, Chicago, Ill.

# INDEX


**Beef Cattle**

Creep-Feeding Calves ..... Jan., 1938
Cow Herds Make the Forage Market ..... March, 1938
Herd Production Costs ..... March, 1938
Fattening Calves on Milo Grain .. March, 1938
Beef without Grain ..... April, 1938
Fattening Cattle on Pasture ..... July, 1938
Ranching, 1938 Style ..... Sept., 1938
Making Beef with Ayrshire Steers .. Oct., 1938
Calves Prefer Oats ..... Oct., 1938
Care of the Herd Bull ..... Nov., 1938
Limestone Feeding ..... Nov., 1938
Application of Breeding Laws ..... Dec., 1938

**Conservation**

Soil Conservation Service ..... Feb., 1938
The Menacing Morning Glory .... March, 1938
Pioneer in Conservation ..... July, 1938
Perpetuation of Wild Life ..... Nov., 1938
What Has Happened to the Shelter Belt, Dec., 1938
A United Front to Reclaim the Dust Bowl, Dec., 1938

**Crops**

A Creeping Alfalfa ..... Jan., 1938
Damping Off of Cotton ..... Jan., 1938
Crotalaria is Good for Southern Soils Feb., 1938
A Grass that Fattens ..... Feb., 1938
Forage Crop Engineering ..... March, 1938
Repeat Profit ..... March, 1938
Our Old Friend Timothy ..... March, 1938
Rare Crops ..... March, 1938
Danger of Unadapted Clover Seed .. April, 1938
An Adventure in Grass Farming .. April, 1938
Barley's Future ..... May, 1938
Increasing Protein Content of Timothy, June, 1938
Handling Hybrid Seed Corn ..... June, 1938
Hayways ..... July, 1938
When There's a Snake in Sudan Grass, July, 1938
Certified Grimm Alfalfa ..... Sept., 1938
History of Hay Making ..... Oct., 1938
Seed Treatment for Small Grains .. Nov., 1938
Permanent Clovers ..... Nov., 1938
Artificial Drying of Roughage ..... Nov., 1938
Story of Yorkwin Wheat ..... Nov., 1938
Made-to-Order Corn ..... Nov., 1938
Nutrients, Not Tons per Acre ..... Nov., 1938
When Wheat Follows Soybeans .... Nov., 1938
Streamlining a Rotation ..... Nov., 1938
Clover Farmer ..... Dec., 1938
Flax as a Gulf Crop ..... Dec., 1938
Winter Barley ..... Dec., 1938
Innoculation for Legumes ..... Dec., 1938
When Buying Hybrid Corn ..... Dec., 1938
Good Crop for Low Land ..... Dec., 1938
Birdsfoot Trefoil ..... Dec., 1938

**Dairy Cattle**

Calf Feeding ..... Jan., 1938
Iodine Feeding ..... Jan., 1938
Raising Dairy Calves ..... Feb., 1938
Index Ghosts ..... March, 1938
Genes, the Basis of Breeding .... March, 1938
Production Records ..... April, 1938
Do High Testing Cows Produce More Fat? May, 1938
New Treatment for Mastitis ..... May, 1938
Danish Dairying ..... June, 1938
Plan for Livestock Improvement .. June, 1938
High or Low Pressure Dairying .. June, 1938
Feeding Experiments ..... July, 1938
Artificial Breeding Society ..... July, 1938
Why Cows Leave Home ..... Sept., 1938
Breeding Dairy Cattle ..... Sept., 1938
Way to Stop Milk Flow ..... Oct., 1938
What Happens to Herd Sires ..... Oct., 1938
Dairy Experiments ..... Oct., 1938
Minerals for Dairy Cattle ..... Nov., 1938
Why Some Calves Die Young .... Nov., 1938
Artificial Insemination Progress ... Dec., 1938

**Farm Machinery**

Winter Gas Engine Troubles ..... Feb., 1938
Tractor Costs Then and Now ..... Feb., 1938
Tractor Care ..... May, 1938
Types of Pumps for Farm Use .... July, 1938
Hay Choppers ..... Sept., 1938
Lubricating Oil ..... Oct., 1938
Increasing the Farm Water Supply .. Oct., 1938
History of Farm Implements ..... Nov., 1938

**Fruit**

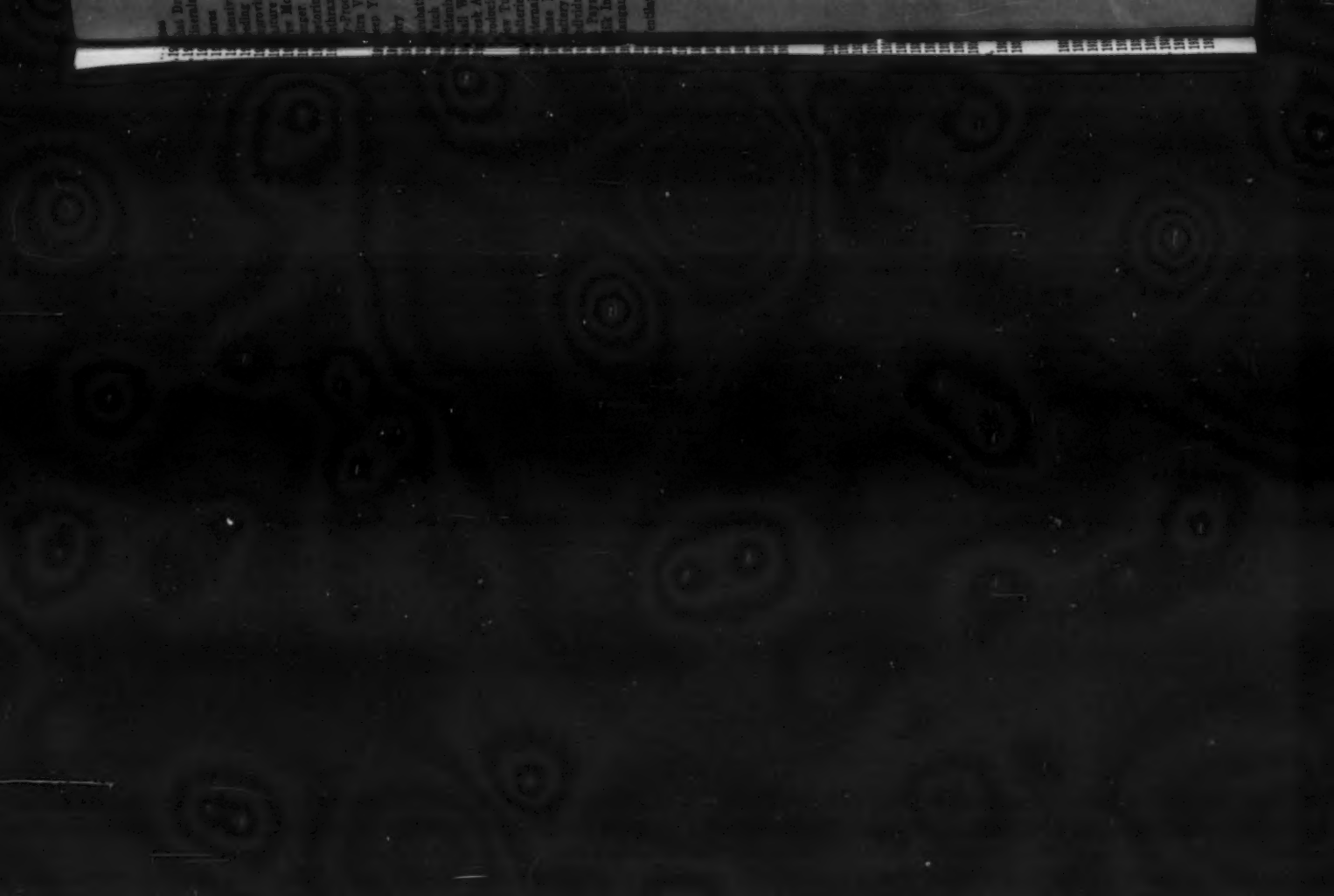
Apple Scab Can Be Controlled ..... Jan., 1938
Re-evaluating the Dwarf Fruit Tree Feb., 1938
Pollination of Fruit Trees ..... March, 1938
Peach Mosaic ..... March, 1938
The Man Behind the Spray Gun .. April, 1938
Raspberry Varieties ..... April, 1938
New Manchu Apricots ..... May, 1938
Alternate Bearing ..... May, 1938
New Varieties of Tree Fruits ..... June, 1938
New Aspects of Fertilization ..... June, 1938
Orchard Irrigation ..... July, 1938
Raising Quality Fruit ..... Sept., 1938
How to Grow Bush Fruits ..... Oct., 1938
Late Keeping Grapes ..... Oct., 1938
Too Many Bruised Apples ..... Oct., 1938
Peach Progress ..... Nov., 1938
Use of Peat Moss in Planting Trees .. Dec., 1938
Incubator Fruit Trees ..... Dec., 1938
Citron Being Produced ..... Dec., 1938

**Fertilizers**

Fertilizer Analysis ..... March, 1938
Mixing Your Own Fertilizers ..... April, 1938
Fertilizer Placement ..... May, 1938
Fertility Loss Must Be Figured .. May, 1938
Small Tonics Increase Yields ..... June, 1938
Phosphatic Fertilizers ..... July, 1938
Fertilizers for the Dairy Farm ..... July, 1938
Drilling Fertilizer ..... Sept., 1938
What Are Fertilizers? ..... Sept., 1938
Humus and Fertilizers ..... Sept., 1938
Your Soil's Limiting Factors ..... Oct., 1938
Soil, Fertilizer Action and Plant Nutrition, Oct., 1938
Functions of Organic Matter ..... Oct., 1938

**Hogs**

Pre-farrowing Management ..... March, 1938
Studies in Hog Type ..... April, 1938
Swine Sanitation Plan ..... April, 1938
Pig Yardstick ..... May, 1938
Outbreeding Best ..... May, 1938
No Pig Wants to be a Runt ..... June, 1938
Pigs, Pasture and Protein ..... July, 1938
Thrifty Pigs ..... Sept., 1938
Pork-Makers ..... Oct., 1938
Bacon for Breakfast ..... Nov., 1938
Selling on Carcass Grade ..... Dec., 1938



# INDEX


**...se**

...t Dread Horse Disease.....April, 1938
...erals and Good Horses.....July, 1938

**...ses**

...tensive Pasture Management ....Feb., 1938
...ding Permanent Pastures ....March, 1938
...proving Depleted Ranges .....April, 1938
...ture Improvement .....May, 1938
...w Models in Pasture Plants.....May, 1938
...nger Grazing Seasons.....June, 1938
...storing the Range .....Sept., 1938
...thrax .....Nov., 1938
...y-Products Profits .....Dec., 1938
...tra Violet Lamps for Poultry....Dec., 1938
...ep Your Litter Dry .....Dec., 1938

**...try**

...cubation the Crucial Period .....Jan., 1938
...Vatch Winter Egg Yields .....Jan., 1938
...ttening for Better Profits .....Jan., 1938
...hall We Heat the Laying House..Feb., 1938
...esh Air in the Incubator .....March, 1938
...oducing Market Eggs.....April, 1938
...w Turkey Disease.....April, 1938
...atteries vs. Range System.....May, 1938
...ternal Quality of Eggs.....May, 1938
...ese Frozen Eggs.....May, 1938
...attery Brooding .....June, 1938
...dividuality Among Hens.....June, 1938
...Pays to Insulate.....June, 1938
...lk Increases Turkey Profits.....June, 1938
...anganese Prevents Slipped Tendons, July, 1938
...entilation for Poultry Houses....July, 1938
Culling Cuts Costs .....Sept., 1938
Is Chick Sexing a Luxury .....Sept., 1938
Stop Coccidiosis .....Sept., 1938
White Oak Quail Farm .....Oct., 1938
Progress in Poultry Feeding.....Oct., 1938
Artificial Lights for Poultry.....Oct., 1938
Why Do Chickens Lay Such Eggs..Nov., 1938
At the Finish .....Nov., 1938
Eggs and Vitamins .....Nov., 1938
No Monopoly on New Ideas.....Nov., 1938

**Sheep**

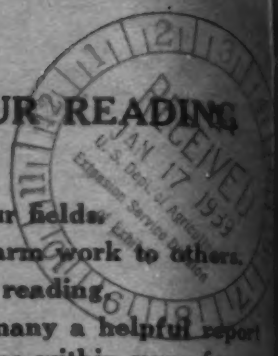
Cornbelt Sheep .....March, 1938
Wool .....April, 1938
Sheep Scab Mite.....July, 1938
Protect Your Sheep .....Sept., 1938
Make Lambs Market Toppers .....Oct., 1938
Feeding and Breeding for Market..Nov., 1938
Sweet Potatoes for Sheep .....Dec., 1938
An Investment in Lamb Production .Dec., 1938

**Silage**

Straw Silos .....Feb., 1938
Grass Legume Silage.....July, 1938
Construction of Trench Silos .....Sept., 1938

**Vegetables**

Conn. Straightneck Squash .....April, 1938
Tricks in Veg. Breeders Trade....April, 1938
Growing Trellis Tomatoes.....May, 1938
Know Your Spinach.....May, 1938
Nutritional Requirements of the Tomato, July, 1938
Battling Garden Bugs .....Sept., 1938

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The Johnson Press, Ambler, Pa.